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THE EFFECTS OF A WORD PROCESSOR ON THE REVISION STRATEGIES OF GRADE FIVE WRITERS WHEN COMPOSING IN THE NARRATIVE MODE

by

RANDALL JOHN KOPP

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ABSTRACT

The purpose of the study was to investigate the nature of grade five revision strategies when writing narrative compositions using a word processor program. The design of the study centred on twelve students writing two stories, one composed with pen and paper and one composed with a computer. Each student was asked to write their choice of story which would not be read by their teacher but should be written for their parents to read. During the three, forty-minute periods given for each task, the students were instructed to make any revisions necessary to make a good story. The Bank Street Writer word processor program was used and mostly Apple II and Apple IIe microcomputers were used. Each student had previous experience with the hardware, had completed the word processor's tutorial and had written at least one story with this word processor program prior to this study. In this study teacher interaction was reduced to a minimum.

The data was collected in five different ways. Text revisions, student and teacher questionnaires, personal observation and interviews of two students and the final written products of the writers were used to study the nature of grade five revision strategies. A percentage of agreement of 0.91 was obtained from a 14 percent sample of revision data collected and categorized. The percentage of agreement was 0.74 between two judges who holistically assessed the

final, written products where scores never differed by more than one point on a four point scale.

The data was analyzed by a holistic assessment of the final, written products composed under the two different writing conditions using a four point scale. Text revisions were categorized using the revision categories from the National Assessment of Educational Progress (1977). Questionnaire data was categorized and summarized.

The results showed that these grade five students make more revisions to their stories with a word processor than when they write with pen and paper. The students composed better stories with a word processor, tended to make a great deal of mechanical revisions such as spelling, punctuating, underlining, paragraphing and capitalization regardless of the transcribing tools used and they make technological revisions such as typing errors and editing command mistakes to their computer-assisted writing.

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CHAPTER ONE

THE PROBLEM: ITS BACKGROUND, NATURE AND SIGNIFICANCE

A. Introduction

Once again the classroom has another brand new instructional tool within its four walls. Many schools have not just one, but a whole classroom full of microcomputers which may include a printer and an assortment of software, such as mathematical games and word processing programs.

To the language arts teacher interested in the writing development of his or her children, this new technology has instigated reactions that range from passive indifference to bandwagon receptivity.

Nevertheless, children are using these word processor programs to write stories, poems and reports on microcomputers that produce clean copies of their work. What is happening in the writing when these children revise their texts on a microcomputer? How does the use of a simple word processor program effect the nature of the revisions that children produce in their writing? Are children doing something different in their writing when they alter the text while composing with a word processor program on a microcomputer?

B. Background to the Study

Recent writing research has indicated a high interest in

the process of writing. One important part of writing is the aspect of revision. It is considered by experienced writers as essential to their task, but revision demands a great deal of time and effort.

In the elementary school, young writers also recognize the difficulty involved with revision. If revisions are essential to good writing and elementary children tend to be "one-shot" writers, then what can be done to encourage children to develop this important aspect of writing?

A number of writing instructors (DiGiammreno, 1981, Hennings, 1981, Woodruff, Bereiter and Scardamalia, 1981, Bradley, 1982, Bereiter and Scardamalia, 1982, Kleiman and Humphrey, 1982, M. Schwartz, 1982, Humes 1983, Kane 1983, Branan, 1984 and Newman, 1984) are suggesting the use of computers to assist in the writing development of children. Sophisticated word processors have been used in business offices for the past several decades. More recently, simpler word processor programs have been introduced into elementary schools. These word processors have been specifically used in the writing instruction of children.

Therefore, what might be the effects of a recently designed word processor program upon the revision strategies of grade five writers?

C. Purpose of the Study

The purpose of this study was to explore the revision

strategies of grade five children when using a word processor compared with those strategies used with a pen and paper.

Word processor programs are specifically designed to make changes to a text written and displayed on a screen. In this study, the Bank Street Writer word processor program was used. Revision strategies of the students, when using the word processor program, could then be identified and compared to the revision strategies of the same students when writing under similar conditions using a pen and paper format.

D. Research Questions

The research questions examined in this study were:

1. What are the revision strategies of grade five students when writing in the narrative mode using a word processor program?

2. What are the revision strategies of the same grade five students when writing in the narrative mode using a pen and paper method?

3. What similarities and differences exist in the revision strategies of the grade five writers with computer-assisted writing and with the use of pen and paper?

4. What effect do revision strategies using a word processor program have on the general quality of grade five students' narrative compositions?

E. Definition of Terms

Revision: the process of retranscribing text already produced by the writer (Nold, 1981).

Revision Strategy: an idea or concern of the writer which helps explain why the writer changed something in his writing. The kind of revision made may reflect the revision strategy used such as a cosmetic revision which would suggest a concern for the appearance of the writing.

Technological Revision: a subcategory of cosmetic revisions which is caused by the nature of the hardware or software of the computer. For example, hitting an extra key on the keyboard would be a typographical error due to the computer's hardware, the keyboard. The result of using the wrong command keys to underline would be an example of a technological revision due to the software.

Word Processor Program: a text-editing software package that turns a microcomputer into a simple word processor which can organize, enter, edit, format and print out text for the user. (Coburn, Kelman, Roberts, Snyder, Watt and Weiner, 1982)

F. Limitations of the Study

The following factors are considered as limitations to the generalizations made from the data collected in this study:

1. The sample for the present study was selected

from two schools within the Edmonton Public School System. Students in other schools and systems may differ in kinds of instruction, individual abilities and experiences.

2. It is possible to revise mentally without ever showing any evidence of revisions in the text.

3. It is possible to desire to revise without actually doing so overtly because the writer may not know what or how to revise. (Bereiter and Scarmalia, 1983)

4. The Bank Street Writer program is only one of a variety of word processing programs.

5. The students had limited exposure to the Bank Street Writer word processing program and may not have been fully able to make use of it's editing features. As well the limited typing skills of the students would have affected their compositions while using the computer.

G. Significance of the Study

Present research studies in the application of word processors to the writing process suggest that there is little evidence to support or refute the potential of word processors as aids to the quality of elementary students' compositions.

This study is interested in providing some evidence

which will reveal to some degree, the nature of writing revision in a new condition, that of using a word processor program on a microcomputer. This study intends to provide further insight into the potential of a technological tool for elementary students' revision strategies. It is hoped that this study will stimulate further research in the field of children's revisions in writing.

CHAPTER TWO

REVIEW OF THE LITERATURE

A. Introduction

In this chapter, the literature relevant to this investigation of the effects of word processors upon the revision strategies of elementary students will be reviewed. It will be necessary, therefore to discuss briefly in this chapter definitions of revision, revisions in the writing process, categories of revision, revision strategies, revisions in writing with computers, word processor effects on writing and schools presently using word processing programs.

B. Definitions of Revision

A number of definitions have been attempted which reflect different author's meanings of revision. According to Gentry (1982), revision has become a general term for other related terms such as editing and rewriting. Graves (1983) simply describes revision as seeing again. By looking at what children change in their writing, one may see what the child sees. Graves suggested that children's concepts of revision expanded in five predictable stages: from spelling, to motor-aesthetic issues to conventions such as punctuation and capitalization, to topic and information and finally to major revisions which included the addition and deletion of

information or organizational revisions. While Graves described revision as a seeing activity, also known as "voice", revision was dependent on the development of the child.

Another definition of revision came out of the extensive work of Calkins (1982) who worked with Graves in case studies of children's writing. Calkins described revision as being aware of an audience and as going back and forth between writing and reading as well as between "involvement and distance".

Calkins (1982) pointed out that young writers revise as they are writing and are also aware of the reader. It was this audience awareness that Murray (1978) also spoke of in describing the revisions of adult writers. Murray indicated that revisions were what the writer does "after a draft is completed" so that the author can understand and communicate what he been written. By reading, confirming, altering or developing the writing after numerous drafts, Murray suggests that the writer develops and communicates the writing to his reader.

These descriptions of revision resulted mostly from the case studies of researchers investigating the writing process. The next section reports on the findings of studies examining revision as a component of the writing process.

C. Revisions in the Writing Process

A number of important case studies about the writing process included the aspect of revision. These studies will be reported in this section to provide more understanding about current knowledge of revision.

One of the critical and first studies done on the writing process was completed by Emig (1971). Emig examined the composing processes of eight, twelfth grade writers who were of average and above average ability. They were asked to write a biography, autobiography and an imaginative piece of writing as well as bring in some samples of their former written work. The students had to compose aloud alone in a room with the researcher. Emig also interviewed each of her subjects about their writing. Emig found that students did not voluntarily revise their writing when it was school-sponsored. A school-sponsored environment meant that the most significant person in the writing context was the teacher. On the other hand, students revised more readily when the most significant person in the writing context was a peer, Emig suggested that revision was too narrowly defined and that more time should be given to reformulation and reconceptualization. Less concern, on the contrary, should be devoted to things like spelling, punctuation or length of writing.

Another key study was completed by Perl (1979) who studied the composing processes of five, unskilled college

writers. Perl used a composing-aloud procedure over four, ninety minute periods and interviewed her subjects to obtain their thoughts about writing. Perl found that all the students displayed consistent evidence of pre-writing, writing and editing. Editing was a major part of the subjects' writing process and it took place during and after each draft. Students showed concern for the lexicon, syntax and the discourse and had problems with syntax and style. Perl suggested three possible reasons for the editing difficulties of her students. First, there was confusion while using the simple editing rules given to the subjects. Secondly, the students were reading words which were not actually in the text and thirdly, the students took for granted the reader's understanding. Perl concluded that editing actually interfered with the writer's thinking and writing and that editing is like an "error-hunting" exercise which reflected a concern for the appearance of the paper.

Finally, Sommers (1980) used the case study approach to investigate the revision processes of students and experienced writers. Sommers wanted to see what role revision played in the writing process. Twenty freshmen students and twenty experienced adult writers wrote three drafts of each of three different essays. Interviews were conducted after each final draft. Four types of revision were identified (deletion, substitution, addition and reordering) and four levels of changes were noted (word,

phrase, sentence and theme). Finally, a scale of concerns was developed from the interview transcripts. Sommers reported that the student writers considered the revision process as a rewording activity and they were most concerned with repetition. The experienced writers, however, were most concerned with finding a framework for their arguement and with being aware of their readers. Sommers found that experienced writers tended to concentrate on adding and deleting sentences even though changes were made at all levels and with all four operations. Sommers concluded that experienced writers identified the revision process as a recursive activity, while student writers thought of it more as finding violations to the rules in their writing.

These studies have shown the part revision plays in the writing of various high school, college and adult writers. Another contribution made in the field of writing has been in the formation of categories to describe revision. Three different category systems will be reviewed below.

D. Categories of Revision

The National Assessment of Educational Progress (1977) made an important contribution to the study of revisions in children's writing. The study assessed the revision skills of nine, thirteen and seventeen year old students across the United States. Two judges assessed how children attempted to revise and how well they revised. A holistic scoring

procedure was used to assess the overall organization of the writing. The nine and thirteen year old students wrote about the moon and were given some facts to support their composition, while the seventeen year old students wrote a complaint letter. Based on the students revisions, the following nine categories of revision were identified:

1. Cosmetic: changes in the appearance of legibility of the original report.
2. Mechanical: changes in spelling, punctuation, underlining, paragraphing and capitalization.
3. Grammatical: changes to fit grammatical conventions like subject/verb or antecedent/pronoun.
4. Continuational: changes which included the addition of a word, phrase, sentence or section to the end of the original report.
5. Transitional: changes which included the addition, deletion, or substitution of connectives or short transitional sections.
6. Informational: changes which included the addition or deletion of information.
7. Stylistic: changes which involved the substitution of a word, phrase or sentence for another where the informational context was not altered.
8. Organizational: changes which involved rearranging the elements at the sentence or paragraph level.
9. Holistic: changes which involved a radicial departure

from the overall approach taken in the report.

The study reported that most students attempted to revise (60 percent of the nine year old students, 78 percent of the thirteen year old students and 68 percent of the seventeen year old students), but that their revisions had little or no influence on the overall organization or quality of the reports completed by the students in the study. In all three age groups the results showed that students made more stylistic, informational and mechanical changes than any other type of revision. The study, among other things, concluded that revisions by nine year old writers reflect a more superficial level of revision than the thirteen year old writers.

The work of Faigley and Witte (1984) was designed to improve the categories devised by the NAEP study. Faigley and Witte considered the NAEP study to be largely "impressionistic" and therefore devised a taxonomy that distinguished between surface and meaning changes. The difference between a surface and a meaning change had to do with information. Surface changes do not add or delete information which cannot already be found or inferred from other information in the text. As a result of applying this distinction and using their taxonomy with college students in a case study approach, Faigley and Witte affirmed that revision was a recursive process. They also suggested that many students have difficulty with evaluating and revising in

order to write about their intentions.

A third type of taxonomy of revisions came from the work of Murray (1978) who basically identified two kinds of revisions. The first kind, internal revision, involved everything the writer did to find out what he has to say. The second type, external revision, was what the writer did when the audience was considered. Murray suggested that external revision tends to be concerned more with the appearance of the writing. The writer under the process of internal revision, however, could discover and develop what he wants to say through content, form and structure, language and voice.

What Murray (1978) suggested by identifiying these two types of revision was that writers used a number of strategies when they revise their work. The next section will report the results of several researchers regarding revision strategies.

E. Revision Strategies

One key question about revision has been what factors influence the writer to revise. This section will review the work of several researchers who have recently attempted to answer this question. The work of Schor (1983), Monahan (1984), Calkins (1980) and Nold (1981) will be reported in order to obtain more knowledge about revision strategies of different writers.

Schor (1983) was involved with a project assisting teachers in bridging instruction in writing and reading between students in their last year of high school and their first year of college. An offshoot of this project became the influence of teachers on their students revisions. Schor looked at the compositions of the project's weakest writers and found that revision was perceived by them as an unpleasant and complex task. However, when teachers gave comments about structure on the early drafts of the students' essays, there were three substantial differences in the writing of the students. First, students filled in more structure by providing more detail and included information deemed absent by the teacher. Secondly, students avoided disturbing the existing structure by removing digressive parts. Thirdly, students made real structural changes such as reordering parts and focusing on a purpose as they wrote several drafts. Schor agreed that instructional feedback to students may not, however, be enough to encourage students to do the larger kinds of revision. Schor concluded that revision requires strategies for reperceiving and a chance to place structural alterations ahead of providing more details or adjusting for correctness. As well, revision requires inventing new ideas and expressing their relationship to what already has been written in the draft.

The impact of the teacher on the revision strategies of writers was also investigated by Monahan (1984). Revision

strategies of basic and competent writers were looked at as they wrote for different audiences. Basic and competent writers were determined by a holistically evaluated essay written prior to their case study writing. Grade twelve students participated in the study and they were asked to explain their revisions at the end of each writing episode. Monahan found that basic writers made more revisions for the teacher audience, while competent writers made more revisions for their peer audience. Both kinds of writers used all the same revision strategies, although the basic writers constraints caused them to use these strategies less often. Effective writers concentrate on content, while ineffective writers concentrate on penmanship. The results of the study suggested that it was not necessary to write neatly to write effectively. Monahan found that revisions made by effective writers sometimes kicked off additional revisions which were labelled "revision episodes".

Calkins (1980) investigated the revision strategies of grade three writers by observing and interviewing students in their writing classes. Calkins found four kinds of rewriting: random drafting, which were successive drafts written without looking back to earlier ones; refining, which was rewriting what was already written; transition, which was moving back and forth between the first two strategies; and interacting, which was revisions based on interactions between writer and draft, internalized audience and evolving

subject where there was a constant struggle between intended and discovered meaning.

Although Nold (1981) was mostly interested in reviewing what other researchers were finding out about differences between skilled and unskilled writers she was also concerned about the false inferences made in the NAEP writing assessment. Nold identified four problems with the NAEP study which reveal more about the study of revision strategies. First, revision should not be considered a one time process that only occurs at the end of the writing. The NAEP writing task was to write for fifteen minutes with a pencil, then to revise with a pen for an additional thirteen minutes if the subject wanted to. In other words, the study did not take into account possible revision strategies going on during the initial paper and pencil task. Secondly, Nold argued that the kind of task given will determine the nature of the revisions. There were less revisions made by the seventeen year old subjects than the thirteen year old subjects because the tasks were different. The older students had to write a complaint letter, while the younger students wrote a report about the moon. Thirdly, revisions cannot be analyzed only from the written text data. It is important as well to find out the primary reason for the change, since there may be numerous explanations for the revisions such as trying to follow the conventions of language or trying to help the reader understand the text.

Fourthly, statistical results do not necessarily provide real value because the amount of revision does not reveal the relative success of the final writing.

F. Summary of Revisions in Writing

The study of revisions in the complex process of writing has recently become an area of interest for researchers involved with children's and adult writing. Definitions of revisions have been broadened, stages and taxonomies identified and the piecing together of various strategies under various conditions have begun to add to the knowledge of revisions in writing. As a result of reviewing these studies regarding revision in the writing process, several contributions were made in the design and purpose of the present study. The researcher decided to investigate elementary students' revisions through a variety of data collection methods which included an holistic writing assessment, direct observations of the revisions in the writing, interviews with observed students, collected compositions and questionnaire data. It became important for the researcher to explore the kinds of revision strategies used by elementary students and to find out why children make the kinds of revision found in their compositions. As well, the researcher found it important to observe the children's revisions during their writing and not simply after a written draft was completed. And finally, the researcher was able to

find a broad classication system for identifying revisions made by elementary students.

Along with the interest in revisions in writing has been the recent educational interest in computer technology. In the next major section of this review the link between revisions in writing and revisions with computers used in writing is presented.

G. Revision in Writing with Computers

Bridwell, Nancarrow and Ross (1984) summarized the current research about word processors relevant to the teaching of composition in the last ten years and reported that research concerning the effects of word processors on writing behaviour was scarce. H. J. Schwartz (1982) in an earlier review of current applications of computers in humanistic education, found four types of computer-assisted instruction in the current educational market including programs which gave feedback information for revision purposes such as readability programs, programs which provided drill and practice to master certain skills, programs which helped students explore and analyze their texts such as for poetry and programs which would interact with the writer. None of these types of programs cited by H. J. Schwartz, however, covered the aspect of word processors. The following review will touch on the various effects of word processors on the writing process but will focus on the

revision function.

H. Word Processor Effects on Writing

Collier (1983) studied the effects of a computer-based text editor on the revision strategies of four college composition students. One purpose of the study was to see whether a word processor would expand the number and complexity of operations used by inexperienced writers when revising. These operations included addition, deletion, substitution and reordering. Results indicated that the number and complexity of the operations employed for revision increased especially in the operation of substitution.

Collier also examined the possibility of an increase in the range of domains in the operations used for revision. Domains included punctuation, words, phrases/clauses, t-units, idea clusters and paragraphs. The results indicated that the number of domains of words and the number of phrases/clauses increased significantly.

Collier also found that although revising strategies of the writers did not differ significantly on or off the word processor, the writers did more revising on the word processor especially with many small scale substitutions. The text editor did not encourage serious or elaborate additions. Paper and pencil compositions, in comparison, were superior in the revisions related to the larger domains of idea clusters and paragraphs. Finally, the use of the

word processor for revising purposes did not enhance the quality of the written products as measured by the former handwritten texts of the subjects which were revised on the word processor.

In reply to the work of Collier (1983), Pufahl (1983) suggested that novice writers should not be assumed to have a set of revision strategies when using a word processor to compose. Instruction should be given to novice writers and word processor users. Pufahl also argued that the teacher, the hardware and the software would influence what the writer does.

Bean (1983) investigated computerized word processing as an aid to revision with four freshmen college students using a central computer as a word processor. Each student followed a cycle of writing which involved writing a quick draft, receiving a print-out, revising the draft, entering the changes on the computer and receiving another print-out of the text. This cycle was repeated until the writer was satisfied with the essay. Bean suggested that the computer could relieve the students of frequent manuscript recopying and could create an incentive to spend more time with revisions. Bean concluded that for some college students, the computer could make a strong impact on the revising habits of their writing. Bean based his conclusions on the results of training twelve writing instructors and four first year university composition students with a central

computer's word processing program.

Bradley (1982) did exploratory studies investigating the use of microcomputer word processors as aids to writing instruction in the elementary school. Bradley first looked at how useful a word processor was for language experience and sentence combining activities. It was concluded that grade one students in language experience groups contributed eagerly, wrote longer stories and made spontaneous revisions. Results from the study which used grade six students indicated that grade six students could easily learn how to use a word processor successfully to complete sentence combining tasks.

Bradley was also interested in selecting the most suitable of three word processing programs for elementary school writing instruction. Bradley divided up the grade six students into three groups and each group was given instruction in one word processor for one hour, asked to perform a sentence combining task, write a composition and complete a four-item questionnaire. She found that between "Easy Writer", "Apple Writer" and "Super Text", the "Easy Writer" program was deemed the best. "Easy Writer" did not split words at the end of the line, had only one editing mode and was easy to learn and remember how to use as indicated by the students' experience and the results of the questionnaire.

As well, Bradley made recommendations to further improve

word processors for future elementary school use. Some of these recommendations included the use of a screen editor, upper and lower case letters, double-spaced displays, having a minimal number of commands and a dictionary for spelling and other structural errors.

Bridwell, Nancarrow and Ross (1984) were also concerned with the differences word processors make in the writing process. They studied the exact behaviours of writers during their writing through the use of two programs. One program records all the keys the writer used to write the text and the other program gives an instant replay of what the writer sees on the screen. Much of the data can also be put together using frequency counts of such things as how often the writer deleted or added text, read back over screen portions of texts or moved blocks of text around.

The second program used by Bridwell, Nancarrow and Ross enabled the researchers to watch the writing take place and made it possible for more precise analysis between revisions and text structure. Using what has been termed "retrospective protocol analysis" the writer could be shown an instant replay of the composing process and asked to talk about what was being thought during that piece of writing.

Using eight experienced, adult writers under four different tasks, Bridwell, Nancarrow and Ross used their two word processor programs to track the subjects writing processes. None of the writers had used a word processor

before but they all had experience in typing. Two hours of word processor training were given to each participant. Preliminary results indicated that some of the writers could not duplicate their former writing methods on the word processor, some eliminated their planning because of the ease with which they could watch their ideas take shape and most subjects revised more because it was easy to do. Some subjects were tempted to tinker with the machine which tended to slow down their writing momentum.

Bridwell, Nancarrow and Ross were also involved with the design of instructional courses for special purposes in writing such as invention heuristics, drafting and revising beyond surface level editing. A third focus of their present inquiry has been how students and teachers can best use word processors in the classroom. As a result, new ways of handling files, responding to student writing and developing exercises was being developed. Bridwell, et al. saw a particular need to set up a screen display of teacher comments amongst the students' writing without interfering with their texts.

Another important kind of research has been the cognitive studies of Woodruff, Bereiter and Scardamalia (1981) and Scardamalia and Bereiter (1983). Woodruff, et al. explored the feasibility of computer-assisted composition in helping grade six and grade eight students handle high-level aspects of the composing process. In the first study twelve grade

six students used a program that featured help in selecting structural elements for opinion essays they had to write. From the response of the students it was found that the program was helpful but a qualitative analysis of their written products suggested that the intervention in the program was too much like a low-level "what next" composing strategy. A second study was therefore carried out which introduced a response-sensitive questioning procedure in the program. Thirty-six grade eight students who had previous computer-assisted mathematics experience were randomly selected in this second study. Twelve Commodore PET computers were used. Three groups of twelve students wrote arguementative essays each under a different kind of program which varied in the degree of intervention with the writer. The key assumption to their experiment was that if children could be given a simple method of evaluating and revising their sentences, called "procedural facilitation", then executive control problems would be reduced and the language production abilities of children could be identified.

Among the results of the second study completed by Woodruff, Bereiter and Scardamalia it was found that, as in the case with the grade six study, these students perceived that the computer made the writing easier, better and more enjoyable, however an eight point primary trait scale used by two judges showed no significant difference in the quality of the compositions under the three different conditions. In

conclusion, it was suggested that an interactive word processor program could influence high-level processing because the effects identified by the two raters in the compositions written with the more highly interactive programs had to do with levels of choices of arguements and overall approach to the essay rather than small units of language.

Bereiter and Scardamalia (1983) later suggested two factors which may account for the revised texts of their earlier study not significantly improving in quality. First, it was argued that since most children are only concerned with small units of language, their revisions would not amount to any overall improvement and secondly, since the number of positive changes did not outnumber the number of negative changes by very much, these children had seldom previously evaluated and revised what they wrote. Bereiter and Scardamalia argued that these children were quite able to detect mismatches between intended and actual text when prompted to look for them, but have trouble identifying the source of their perceived difficulties.

Kane (1983) explored the potential of word processors for promoting the development of writing skills with special emphasis on revision. Using the "Apple Writer" word processing program, five grade eight students wrote a composition of their choice over a period of five or six class sessions. Kane reported that these students were able

to use the word processor for composing and preferred it over paper and pencil. Most revisions were corrections to spelling and punctuation although one student who had experience with a word processor at home, added, deleted and reordered sentences in her text. Kane could not confirm the notion that students would become more fluent and more flexible as writers by using word processors because of the briefness of her study. A ten week mini-course was too short a time to show any fundamental changes in the writing patterns of the subjects. Kane suggested however, that using a word processor might facilitate the revision strategies which students already possess. Word processors may even motivate students to learn new strategies for evaluating and revising their text since it is easier to alter the text on a word processor.

I. Schools Using Word Processing Programs

In this section, a number of studies examining schools using word processing programs will be reported. Branan (1984) reported from her interview with one grade five teacher using a computer in his classroom that revising is made much easier. Children in his classroom could mold the text by inserting, deleting or rearranging words with a few simple command keys and the publishing stage of writing became more efficient.

DiGiammarino (1981) introduced text editing to his fifth

grade class and reported that the students were learning the skills of revision and the art of written expression as well as writing longer stories, following directions and paying attention to detail. DiGiammarino found that his more advanced students edited directly from the monitor's screen, while novices seemed to do best when they edited a print-out copy of their text before making changes on the screen.

Humes (1983) reported on an interactional program that uses the computer to change and produce text for sentence combining activities. Students in grade four and six were able to handle the instructional content and managed the word processing procedures better than anticipated. Students were able to combine sentences and produced correct syntactical structures except when they inserted too many words.

Kleiman and Humphrey (1982) worked with learning disabled children between the ages of seven to sixteen usilg a word processor. Even though many of the students had previously refused to do any kind of writing, these same students wrote enthusiastically with the word processor. Kleiman and Humphrey reported that these children began to write more, edit more and produce better compositions. These children were specifically more careful of correct typing, spelling and punctuation errors, they changed words and large sections of text and they gave more attention to meaning and order in their texts.

A number of educators commenting on the value of

computers in the classroom have suggested a variety of potential advantages for children's writing. Hennings (1981) suggested that word processing systems could be used effectively to create, record and edit experience story charts in the primary grades while the drafting stage of writing could be accommodated in the upper elementary grades.

Newman (1984) believed that being able to experiment with the language, develop story arguements and play with the structure and tone of a writing could be enhanced by using a word processor. Newman also suggested that writing with a computer allows the writer to take more risks, be tentative about text meaning for a longer time and consider organization and word choices more carefully.

M. Schwartz (1982) argued that the computer was psychologically and technologically suitable to help the writer write more, risk more and achieve more fully developed writing. M. Schwartz also suggested that writers could explore new meanings without the penalty for trying since the notion of revision as a punishment would be greatly reduced. As well, the initial fear of making mistakes would be reduced for those writers who lack confidence and skill in playing with the language.

Madigan (1984) argued that computers contribute to more extensive revision strategies through the physical distance separating the writer from the writing which in turn encourages aesthetic distance. Because a computer-produced

text is less a part of the writer, there is more freedom to critique and revise it. Madigan also suggested that microcomputers help shape the composing process and this will be influenced by the amount of experience the student has with the computer, the degree that computers mesh with writing instruction and the kind of software used.

Daiute (1982) summarized current knowledge about writing and word processors and indicated that computer writers are less concerned about mistakes, tend to compose longer manuscripts on the computer and revise more on the computer. She also suggested that these writers tend to do more experimenting and rewriting and young children generally focus on the insert and delete options of the word processor.

Finally, Green (1984) obtained an interview from Donald Graves about computers and children's writing. Graves indicated that the computer as a word processor could speed up the publishing process, may help young writers overcome the problem of handwriting and may help them in the drafting process. Graves also saw the advantage of the word processor as a research tool because of the ability of some programs to record and classify revisions that writers make.

J. Summary of Computers Used for Writing

A number of researchers and educators have argued in favor of the potential computers as word processors could have with students in their writing. Tentative classroom

findings and opinions suggest that the writing process is enhanced because of the ease of revision, the longer drafts produced, the ease with which the editing commands can be learned on a word processor and the amount of revision done. Research studies do not support conclusively that the quality of the writing improves with the use of a word processor, although it was often suggested by the subjects that they enjoyed using the computer for their writing. There is some evidence to suggest that different revision strategies exist while using a word processor.

The computer studies mentioned in this section of literature review contributed to the purpose and design of this study. It became apparent from the literature that not only adults but children also could make revisions to their compositions with a simple word processor program. Thus, this study was able to involve grade five elementary students with some experience using a simple word processor program. With few studies completed with elementary students, it also became important to investigate revision strategies at this age category since some work had been completed already in the field of children's revision in their writing (National Assessment of Educational Progress,1977, Calkins,1980, Graves 1983). Now it would be possible to investigate the effects of a word processor in performing revising functions in children's writing. Because the evidence for word processors improving the quality of written work was inconclusive with

studies involving adolescents and adults, this knowledge provided a reason for comparing the quality of compositions using a computer with the quality of paper and pen written compositions in elementary-age writers as well.

Therefore, this study evolved to a large extent from the present research knowledge about revision with word processors. It has become necessary that further research be completed to broaden and clarify the ideas suggested from this review of the literature.

CHAPTER THREE

DESIGN OF THE STUDY

A. Introduction

This study was designed to explore the revision strategies of grade five children when using a word processor compared to those strategies used with a pen and paper. This chapter describes the sample, the methods of data collection, the instruments used in the data collection, the methods of data analysis, the reliability of the scoring and the pilot study conducted before the study began.

B. Sample

In this investigation, the revision strategies of twelve grade five students, four boys and eight girls, were identified in two similar but distinct narrative writing conditions: using pen and paper and using a microcomputer.

Two schools using the same word processor programs were identified through the Edmonton Public School Board computer consultant. The computer consultant provided a list of elementary schools using microcomputers in their language arts program. The researcher selected from the list two schools known to have grade five students who had some experience with the Bank Street Writer word processor program.

The researcher requested the teachers from the two

classrooms to provide a list of six grade five students who in their opinion were fluent writers. Fluent writers in this study referred to students in the teacher's classroom who wrote a great deal in their compositions.

At one of the two schools selected for the study, called school Y, there was an enrichment program whereby a certain number of selected students from each grade were given instruction in logo and writing instruction using the Bank Street Writer word processor program. These students received approximately forty minutes per week of this kind of instruction from the beginning of the school year by the enrichment teacher. Six students from this school's one grade five classroom were involved in their school's enrichment program and these students were used in the study. There were three boys and three girls in this group of students selected for the study. The school was located in an urban, middle-class district in the city of Edmonton.

At the other school called school X, the six grade five students were part of a split grade five/six classroom whose teacher had begun that year using the Bank Street Writer word processor program with her students. She used the word processor to help the writing development of her students who were following the Graves' model of writing. This teacher had regularly scheduled, weekly time for her classroom in the school's computer laboratory. Six of her grade five students, whom she considered the most fluent, were involved

in the present study. Five of the students were girls and one student was a boy. This school was located in an urban, lower middle-class district in the city of Edmonton. The approximate age of the children involved in this study from both schools was ten years.

The twelve, primary-selected students for the study had previously written at least one story on the microcomputer and had gone through the Bank Street Writer program's tutorial lessons under the teacher's supervision.

All grade five students in these two classrooms were requested at the end of the study to complete a ten-item student questionnaire concerning writing and revisions. There were twenty-three grade five students from school X and thirteen students from school Y which participated in the questionnaire.

As well, three teachers completed a four-item questionnaire at the end of the study. At school X, two teachers were involved in the study because the paper and pen writing condition involved the grade five home room teacher, while the enrichment teacher was involved with the same students when completing the computer-assisted writing task. At school Y, the same teacher was involved with her students under both writing conditions, although she was helped by the computer laboratory assistant in their school.

One child from each school was selected by the teacher for direct observation and interviewing of revisions during

each writing session. The two students were selected according to their ability to write a great deal. During the first paper and pen writing session at school Y, the girl selected asked if she could be excused from direct observation and questioning.

It was uncertain why the girl did not wish to be interviewed or observed. She may have found it uncomfortable to be carefully observed and questioned about the revisions she made since this was not how she typically wrote a story. Because of the tape-recording required it was necessary to have her sit beside the researcher at the back of the room and write at a table and this may have distracted her. However, during this time another grade five student came and sat at the table across from the researcher. With his writing material, the boy continued writing his composition. He became the replacement for the first subject because the researcher was able to record all of his revisions and obtain the reasons to each of his revisions made during this first writing session. After the first session was over, the researcher discussed the situation with the classroom teacher and it was agreed that the second student could replace the original student.

C. Method of Data Collection

Before the data was collected, permission was obtained from the Edmonton Public School Board to conduct the study in

three elementary schools, one school for an initial pilot study and the two others for the actual data collection. After permission from the board was received and the teachers concerned were in agreement with the purpose of the study, letters to parents were sent home with the students requesting permission for student participation in the study. A copy of the letter may be found in Appendix E on page 129. All students in the study were granted parental permission to participate.

To reduce the effect of transfer of revisions from one writing condition to another, school X began their computer-assisted writing task first, then went on to the pen and paper task under similar conditions. School Y, however, did the tasks in the reverse order.

Before the study began, the teachers from each school received a copy of their responsibilities in the study which included explicit, standardized instructions for the students' task. These responsibilities included assigning and supervising the narrative tasks, selecting two fluent writers for observational purposes and completing a brief questionnaire after all student compositions were completed. These instructions are found in Appendix E on pages 130 and 131.

The students were asked to write a story of their own choice in three separate writing sessions of approximately forty minutes in length. A set of pictures to help generate

ideas for stories were provided for optional use. Students were encouraged to write a good story for their parents and make any necessary changes to the story. It was made clear that the story was not going to be read or handed in to their teacher. Children were advised to let their teacher or the researcher know when their initial attempt was completed so that a copy of their composition could be made for later analysis. Similar instructions were provided for the computer-assisted task, except for several obvious differences. On the microcomputer, children were required to save their work just prior to the end of their writing session so that a permanent record could be obtained. When an initial attempt of their computer-assisted story was completed, students were allowed to obtain a print-out copy with the assistance of their teacher. A pen was provided for the students if they wished to make revisions to the print-out copies of their stories. Children could request as many print-out copies during the three existing sessions as they wished. Their compositions and revised work were stored on their own supplied computer diskettes. Copies of the two interviewed students' computer-assisted compositions have been placed in Appendix E on pages 142 and 144.

The computer-assisted task was performed on Apple II and IIe microcomputers with a Centronex dot matrix printer and the Bank Street Writer word processor program. The Bank Street Writer's text editing mode enabled each student to:

relocate words, phrases and sentences; erase and put back letters, words, phrases or sentences; and to find and replace a set of letters or words.

During the actual composing, the researcher observed and interviewed one student at each school in each writing session. The purpose of the observations was to record all the revisions the student made during the composing and the interviewing was designed to obtain the student's explanation for each revision made. The researcher recorded these reasons on previously designed notetaking forms and with the aid of a cassette recording of the interviews. Samples of notes and transcriptions are found in Appendix E on pages 132-135.

Each writing session was approximately one week apart under both writing conditions. All writing sessions at each school occurred during the morning of the school day. The writing tasks began in February and ended in early April of 1985. Within a week, after all students had completed their three writing sessions using pen and paper and their three computer-assisted writing sessions, teachers and students each completed a brief questionnaire which provided information regarding their attitudes towapd writing and revision. Copies of sample questionnaires have been placed in Appendix E on pages 136-138.

D. Instruments of Data Collection

As mentioned earlier, five different instruments for data collection were used. These instruments included an holistic writing assessment of the children's writing, student and teacher questionnaires reflecting their practices and attitudes about writing and particularly revision, the students written texts for revision identification and analysis and the recorded interviews of two students' revisions and reasons for their revisions during each writing session.

1. Holistic Writing Assessment

The researcher selected as raters two graduate students from the Department of Elementary Education who had extensive elementary classroom experience. Guidelines for assessment were given to each scorer. These guidelines are found in Appendix E on pages 139-141. After being trained for three hours to obtain at least two rangefinders at four different levels using the writing samples of students in the same classrooms as the students in the study, each scorer assessed the final written products of eleven students. One student's composition completed on the computer was a poem and therefore her work was not holistically assessed because of not being a story. There were therefore, only eleven instead of twelve paper and pen stories and eleven computer-assisted stories assessed using a four-point scale. General

guidelines for holistic writing assessment used by the Student Assessment Branch (1980) of the Edmonton Public School Board were followed in this study. The scorers were not informed until after the assessment which students wrote which handwritten and computer print-out stories and their resultant scores.

2. Student Questionnaires

Immediately after the writing tasks, twenty-three grade five students from school X and thirteen students from school Y completed a ten-item questionnaire. The purpose of the questionnaire was to obtain information about the children's writing and revision practices and attitudes. The responses from the questions were tallied and categorized depending on the type of question and reported in tables referred to in Chapter IV.

3. Teacher Questionnaires

At the same time that the student questionnaires were completed, the teachers also completed a four-item questionnaire which was accompanied with a list of the revision categories established by the National Assessment of Educational Progress (1977). The purpose of the teacher questionnaire was to determine the extent of revision instruction provided by the teacher to the students. This information is reported in Chapter IV.

4. Written Texts

The fourth means by which the data was collected was through the tabulation of revisions made from each text composed by the students under the two different writing conditions. At the end of each writing session, the researcher made a duplicate copy of each student's written piece. By carefully observing the written texts, it was possible to obtain a record of all the revisions made between each writing session on each student's piece of writing under the two writing conditions. Thus, it was possible to analyze the nature of students' revisions to their writing between each text and under the pen and paper condition. It must be mentioned, however, that without direct observation, it would not be possible to identify on the computer-assisted text, any of the revisions made during the actual writing. This is because the print-out copy of the text would not show attempts to revise, only the final product after the revisions. It was for this very reason that the author designed a fifth means of collecting the necessary data which is described in the next section.

5. Individual Student Interviews

The researcher obtained direct information from two students during their entire writing sessions using the pen and paper and using the computer. Revisions made by the students were observed by the researcher and recorded on a previously established revisions form. As well, the

researcher asked the student under direct observation for an explanation of the revisions made. For example, the student was asked to explain what happened or what he was thinking when he made the revision. This data was also recorded on the revision forms and a tape recorder was used as a back-up to obtain the necessary explanations made by the student. Chapter IV, in the appropriate section, provides the results of the interviews obtained through these measures.

E. Reliability of the Scoring

The reliability of the holistic scoring assessment and the categorization of revision data was established through inter-scorer agreement. The percentage of agreement between two scorers was computed using the Arrington Formula as used in the study by Jackson (1968) and Feifel and Lorge (1950). The percentage of agreement equals:

$$\frac{2 \times \text{Number of Agreed Scores}}{2 \times \text{Number of Agreed Scores} + \text{Number of Disagreed Scores}}$$

The holistic writing scores and categories of revisions and reasons for revisions which were identified as the same were doubled then divided by this same figure plus the number of disagreements to obtain a percentage of agreement.

It was found that the percentage of agreement on the holistic writing assessment was 0.74 for each narrative judged and was 1.00 when the difference in scores was never greater than 1 point out of a possible 4 points. It was also

found that the percentage of agreement for the categorizing data between two judges was 0.91 for a 14 percent sample of all the categorized data.

Thus for this study the reliability of the holistic writing assessment and the categorization of collected data was satisfactory.

F. Pilot Study

Prior to the investigation, a brief pilot study was completed to achieve the following:

1. determine the feasibility of the time and methodology used to collect the data.
2. gain experience in conducting the procedures used in the study.
3. determine possible problem areas not anticipated in the study.
4. determine if grade five students were suitable subjects for the tasks in the study.
5. find out if these students had a working knowledge of the computer and word processor.
6. test the usefulness of the written task.

The pilot study was completed to show how useful and practical the tentative design of the study might be. It was important to find out if there was enough time for students to complete the written tasks within the schedule and present arrangements of the two classrooms involved. It was

necessary to find out what materials the researcher needed to supply for the study such as diskettes, writing paper, pens, pictures, observation sheets and the word processor program disks. It was important to find out if the tasks were reasonable for this grade level and what specific instructions the teacher should be given. It was necessary for the researcher to try out the recording equipment and determine where the subjects would be located during the study. It was critical that the students provide sufficient writing for the researcher to identify their revisions for further analysis. It was critical to find out how many students the researcher could realistically interview in the time provided. It was helpful to find out how long it would take the students and teachers to complete the questionnaires and how suitable the questions were in obtaining the kind of data desired for the study. It was this kind of information that the researcher needed to know which would be obtained from a pilot study.

When the pilot study began, the researcher received from the grade five teacher two students who were familiar with the Bank Street Writer word processor program and who liked to write a great deal. Before the students arrived, the computer was turned on and the program was loaded and a labelled, blank diskette was ready to be used in the disk drive. The tape recorder was ready to be turned on and observation notes were in place for the researcher to use.

The instructions given to each student included: write a story using a choice of pictures or several narrative lead-in statements provided, talk out loud as you are composing and use the pen provided to make any changes to your print out copy when you are finished your first draft. The researcher tried to observe both students compose stories on a microcomputer using the Bank Street Writer word processor program during a forty minute period of time. However, it was very difficult to observe two students composing at the computer at the same time. The researcher recorded the revisions made by each student and asked the student how he/she went about writing their composition, what would be done next with the piece, what he/she thought of the piece and what was the reason for each change that was made. The researcher met with the students again on another occasion and repeated the questions and recorded more revisions made by the students. After two sessions, the researcher gave the students and teacher a questionnaire to complete. The tape recordings, answers to interview questions and revisions were later studied to see how they could be used to achieve the purpose of the study.

As a result of the pilot study, it was determined from the collected information that fluent grade five writers would provide ample revision data and three periods of writing would be sufficient for grade five students to provide the researcher with enough written data. The

narrative lead-in instructions were not used but allowing each child the choice of their story topic or using a picture to stimulate story ideas was sufficient. The talk aloud procedure did not work for one student and tended to slow the other student down too much when writing and therefore was removed from the task. Providing a pen for revising was useful when the student needed to revise something after he/she received a first draft. The questions used were not all useful because they did not provide information specifically about the revisions occurring in the writing and should be dropped to simply ask the reason for making each change to the composition. It also found that it would be unreasonable to try to interview more than one student at a given time. Finally, having the equipment checked to be in working order,set up in advance and ready to be used proved to be helpful and prevent future data collection difficulties.

G. Data Analysis

In this section, the analysis of the data collected will be explained according to each of the five instruments used.

First, the holistic writing assessment was analyzed by comparing the two scorers' holistic writing scores for each child's story composed with pen and paper and with the aid of a microcomputer. This data was summarized in Appendix A in Table I on page 112. Observations were made by comparing how

the paper and pen stories rated when compared to the computer-assisted stories written by the same students. General scoring patterns as well as individual differences in scoring were identified between the two writing conditions.

Secondly, the student questionnaire instrument was used to analyze the students' responses to questions about their writing and revising. This information was summarized and placed in Appendix B in Tables II to V on pages 114-117. Question items #1, 3, and 7 were simple yes/sometimes/no responses which were tallied and from which observations were made. Question items #4, and 9 were kinds of revisions made and based on this information, eight categories were formed by the author to report the results of these questions. Question items #2, 6, 8, and 10 were explanations for writing and revisions. From the explanations, the author placed the responses into different categories which made the data easier to place in tables and report on. Question item #5 was tallied according to three categories given to the students and observations were made according to the categorized and tabled data.

Thirdly, the information obtained from the teacher questionnaire instrument was simply summarized and reported in the results section of Chapter IV.

As well, the written text data collected from each student was analyzed by comparing each student's texts from writing session to writing session. Using the revision

categories established by the National Assessment of Educational Progress (1977), each text's revisions under both writing conditions were identified, tallied and placed in summarized tables. When the NAEP categories were used, a subcategory of cosmetic revisions emerged in the compositions completed with the computer. This subcategory was described as "technological revisions" and included typographical errors due to the hardware such as hitting an extra key accidently as well as making revisions due to making an error with the editing commands of the software such as not remembering how to underline. As well, a general summary of all the revisions done by the students under the two writing conditions was made. Similarities, differences, unique features and revision patterns were reported from these results.

Finally, the revisions of two students in the study were observed, recorded and tabulated. This data was analyzed by using the same revision categories used in the text analysis. Similarities, differences, general patterns and unique features were reported based on the revision categories identified from their writings under the two conditions. Since the researcher was directly observing the two students, revisions were observed during the entire course of the student's writing.

H. Summary

The design of the study essentially centred on twelve students writing two stories, one on computer and one with pen and paper in order to obtain data about the revision strategies in their writing. After obtaining three schools, a pilot program was completed to establish suitable procedures and gain experience in the design. Immediately afterward, the study was begun and data collected using five different techniques. A holistic assessment of the final written products, teacher and student questionnaires, the synthesizing of students' revisions from their texts and direct observations and interviews of revisions and reasons for revisions were completed. The results of the data collected have been reported in Chapter IV with samples, tables and guidelines placed in the appendices.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

A. Introduction

In this chapter the five different parts of the study are reported followed by a summary of the findings. The first section reports the holistic scoring results. The second section deals with the results of the student questionnaire data differentiated by four different groups of questions. The third section reports the results of the teacher questionnaire data. The fourth section reports the students' text revisions with paper and pen, with computer-assisted revisions and a comparison of their similarities and differences. The final section reports the text revisions of individual students studied in more depth. A summary of all the data will be provided at the end of this section.

B. Holistic Scoring Data

Two trained scorers assesssed the quality of eleven students' final compositions. One student wrote a poem on the computer and a story with paper and pen. It was therefore necessary to remove her compositions in the holistic assessment and this is the reason why there were eleven instead of twelve students involved with this part of the data analysis as indicated in Appendix A in Table I on

page 112. It was found that the two scorers gave the same score to thirteen of the twenty-two stories assessed using a four point scale while the remaining assessment scores never differed by more than one point out of a possible four points. As indicated in Table I, nine out of the eleven students scored higher on the stories which were written on the computer, than the stories written with paper and pen. The total score of the paper was the sum of the two scorer values and from this total it was found that the range of differences between total scores was from one to three points. An average of 6.0 was obtained for compositions written with paper and pen while an average of 7.2 was obtained for compositions written on a computer.

One interesting finding was that the two students who scored highest with their paper and pen compositions were the only two students whose computer-assisted compositions were lower in score. In one case it was by two points while in the other by three points.

In summary, the holistic quality of computer-assisted grade five stories were considered generally better than the paper and pen stories written by the same students. The exception to this was that two students who scored highest in the paper and pen story were the only two students whose holistic scores were lower on the computer-assisted writing.

C. Student Questionnaire Data

Introduction

The results of the data collected in the student questionnaires were divided into four sections. The first section reports information about their response to writing a great deal and the reasons they gave. The second section reports information on who makes changes to their writing and when they do it. The third section reports the kind of changes made and the reasons for them. The last section of the student questionnaire data reports on the number of students who thought revisions improved their writing and the reasons for the improvement.

1. Responses and Explanations for Writing Profusely

Twenty-five out of the thirty-six students who responded to item #1 on the questionnaire indicated that they like to write profusely. One student said he sometimes liked to write very much. Thus, about 70 percent of all the students indicated that they liked to write profusely.

From the data collected from item #2 of the questionnaire and presented in Appendix B in Table II on page 114, twenty-eight students indicated thirty-three reasons for writing profusely. Most of the explanations were different from each other. As shown in Table III on page 115, nine students provided ten assorted reasons for not liking to

write a great deal.

2. Revisions and When They are Made

Thirty-six students responded to item #5 of the questionnaire which asked students whether they made revisions to their written work. Twenty-six students indicated a positive response while eight students said they made revisions sometimes to their work. Thus, all those students who responded to this item of the questionnaire indicated that they made at least some revisions to their written work.

Thirty-four students responded to item #5 of the questionnaire which asked when students made revisions to their writing. Three responses were provided for the students to choose from. It was found that from the thirty-six answers given, fifteen of the responses were for making revisions throughout the writing, ten responses were associated with making revisions at the end of the first draft, eight responses were associated with revisions made during the final draft and three responses were associated with other possible times to revise. Thus, a substantial amount of revising goes on throughout the writing period, although other times of revision were associated to a lesser degree with the first and final draft.

3. Revisions and Why They are Made

a) Pen and Paper Revisions

A total of twenty-nine students responded to item #4 of the questionnaire which asked what revisions were made to the written work. Based on NAEP's revision categories, the results from Table IV in Appendix B on page 116 indicated that, of the fifty-eight answers provided, about 64 percent of them were associated with mechanical revisions, about 9 percent were cosmetic revisions, about 7 percent were informational revisions and the remaining 20 percent were a mixture of possible grammatical, transitional or stylistic revisions.

Thirty-five students provided forty-three responses to item #6 which asked students why they made revisions to their written work. Seven different categories were derived from the explanations for revising their written work. These categories included a concern for appearance, a specific writer's intention such as "to make it exciting," a desire to convey the writer's intended meaning, a concern specifically for the reader, a concern for the convention of written language, a general concern for general improvement and a concern which could not be identified. From the forty-three responses, it was found that 33 percent of them were associated with the writer's concern for intended meaning, 16 percent were appearance concerns, 16 percent were reader-awareness concerns, 14 percent were conventions of language concerns, 9 percent were for a specific author's intentions, 9 percent were for general improvement and the

remaining 2 percent were unsure why they had revised. Thus, the students said that they revised for a variety of reasons, but the most prominent explanation was a concern for getting across their intended meaning.

b) Computer-Assisted Revisions

Thirty-one grade five students from the two schools in the study responded to item #9 which asked what revisions were made when using a computer. As indicated in Table V on page 117 in Appendix B, about 50 percent of the responses were associated with mechanical revisions, about 25 percent were cosmetic revisions which included technological revisions such as "typing errors" or "making new lines," about 7 percent were related to informational revisions and the remaining 18 percent were related to a mixture of possible grammatical, transitional or stylistic revisions. Thus, mechanical kinds of revisions are said to be a large portion of these students' revisions.

When asked why these revisions are made when using a computer, the twenty-nine students who responded to item #10 of the questionnaire provided thirty-two explanations. Using the same general categories described in the previous section, it was found that 28 percent were related to the writer's intended meaning, 18 percent were for reader awareness, 13 percent were for appearance, 13 percent were for conventions, 13 percent were not sure, 9 percent were for technological reasons, 3 percent were for writer's specific

intentions and 3 percent were related to general improvement concerns.

Thus, there was again a wide range of explanations for revising on the computer and the most prominent concern of all was again, to get across the writer's intended meaning.

4. Revisions and Writing Improvement

Thirty-six students responded to item #7 of the questionnaire which asked students whether or not revisions improve the quality of the writing. Thirty-two students indicated that at least some of the time, revisions improve the writing.

Of the thirty-one students who responded to item #8 of the questionnaire which asked for an explanation as to why they thought revision improves their written work, a total of thirty-four responses were provided. Again, using the earlier mentioned categories of revision explanations, it was found that 29 percent were related to intended meaning, 26 percent were for reader-awareness, 24 percent were for appearance concerns, 6 percent were for the writer's specific intentions, 6 percent for language conventions, 6 percent for general improvement reasons and 3 percent were for unsure reasons. Thus, the students as a whole believed that revisions improved their written work for a variety of reasons and the writer's concerns for intended meaning, reader awareness and appearance were considered the most prominent explanations for these improvements.

5. Summary

The results of the data collected from the ten-item student questionnaires indicated several notions about writing and revisions. Most of the students in the study said they like to write a great deal for a variety of reasons. Almost all the students said that they made revisions and said that they did it quite frequently throughout their writing. Most of the revisions the students said they made were of the mechanical kind such as punctuation, capitalization, spelling and making new paragraphs and the most predominant reasons given for their revisions was to get across their intended meaning. Under a computer-assisted writing conditon, these children indicated mechanical revisions again as the most prominent type of revision. A variety of reasons for revising on the computer were given but the most frequent reason given was to get across the writer's intended meaning. Finally, almost all the students thought revising improves the quality of their writing at least some of the time and they indicated a variety of explanations for the improvement such as reader awareness, appearance and concerns for getting across their intended meaning.

D. Teacher Questionnaire Analysis

Introduction

Three teachers who instructed the twelve study students

in language arts and/or computer-assisted instruction, completed the questionnaire after the writing tasks were finished. These teachers reported the kinds of revisions and student strategies taught to and used by the students. In their perceptions, they also provided an explanation for student revisions as well as their personal value of revisions in the writing process. This information will be reported below.

1. Kinds of Revisions Taught

At school X, one of the two teachers said he taught cosmetic, mechanical, grammatical and transitional revisions, while the other teacher at this school said she had taught all the types of revisions indicated in the NAEP study except continuational and holistic revisions. As well, instruction in keyboarding skills, using the word processor and writing skills were provided.

At school Y, the other teacher indicated that she had taught her students cosmetic, mechanical, grammatical, continuational, transitional and informational revisions in addition to using teacher conferencing, peer conferencing and an editing chart for reminding her students.

2. Student Revising Strategies

At school X, one teacher suggested that most of his students revised to make cosmetic and mechanical improvements. However, a few of his students used more

sophisticated strategies which involve changing or clarifying their intended meaning. The other teacher at school X reported observing some of the study students using all but holistic revisions as part of their revision strategies.

At school Y, the teacher reported that her students used peer conferencing and checking the editing chart as their primary revision strategies.

3. Teacher's Perceptions of Students' Revision Strategies

One teacher at school X thought that his students revised their texts because they felt it would improve their final product, while the other teacher at the same school felt that her students liked to do their best work because it was usually put on display or sent home indicating an influence of audience upon revision.

At school Y, the teacher reported that her students revise their work because the teacher and other students suggest it, because after reading their own work, it does not sound right yet and because it is required to revise in her classroom.

4. Teacher's Value Toward Revision

At school X, one teacher believed revision was a technique to improve writing and as a means for students to improve their ability to express their feelings, observations and ideas. The other teacher basically believed revision was a part of children's growth and development of their

schoolwork.

At school Y, the teacher indicated that revision in grade five writing improves communication skills, improves awareness of the elements of good writing and keeps students involved with their writing, especially the thinking aspect.

5. Summary

The teachers reported that all the students received some instruction in the first six revision categories of the NAEP. In addition, students at school X received stylistic and organizational revision instruction while at school Y, the students received individualized teacher and peer conferencing.

At school X, one teacher felt his students tended to make cosmetic and mechanical revisions but both teacheps at school X agreed that some students make more sophisticated revisions. At school Y, teacher and peer conferencing tended to be the approach these students take with revisions.

At school X, the teachers felt improving the final product and showing it to parents and other pupils were reasons for students revising their work. At the other school, the teacher felt that teacher and student encouragement and getting out the intended meaning were the major reasons for students revising.

Finally, teachers at school X valued revisions because it was a method of writing improvement and self-expression

while at school Y, the teacher saw revision as a means to improve communication skills, thinking and becoming more aware of good writing elements.

E. Text Revision Analysis

Introduction

In this section of the data analysis four parts of the students text revisions is reported. The first section will provide an overall view of the total revisions classified from the initial and second session of writing. Within each section a comparison between pen and paper and computer-assisted revisions will be made. The second section will present an analysis of the revisions made on the initial session's text during the second session of writing. The third section will present data which focusses on revisions made to the second session's text during the third and final session of writing. Finally, a fourth section will compare the similarities and differences of revisions between the first and second session of writing.

1. Classifications of Total Revisions

Twelve students wrote two compositions, one with paper and pen and the other with a computer. By comparing the text composed during the second session of writing with the text written during the first session of writing, it was possible to identify the kinds of revision each student

made to his text. In a similar way, third session texts were compared to second session texts to identify the kinds of revision made during the second session of writing. Then, the revisions made on the initial composition and the second period's composition were totaled together and a percentage of the total revisions made were calculated for each revision category used by the National Assessment of Educational Progress (1977). Not all of the twelve students made revisions to the initial and second session texts. All twelve students revised to varying degrees on the initial text using the paper and pen condition and the computer condition. However, eleven students made revisions to their first and second session's computer-assisted texts while only five students made revisions to their second session's paper and pen text.

a) Computer-Assisted Text Revisions

The results contained in Appendix C in Table VI on page 119 show that of all the revisions identified for computer-assisted writing, 31 percent were mechanical, 24 percent were cosmetic which included technological revisions, 16 percent were continuational, 15 percent were informational, 9 percent were stylistic, 3 percent were transitional, 2 percent were grammatical, and 0 percent were organizational or holistic revisions.

When comparing the NAEP results to this study's computer-assisted revisions, there were five major

differences between the NAEP study and the present study. Five categories of revision in the NAEP study were substantially higher than in the present study. These categories included stylistic (NAEP 25.8 percent, present 9 percent), informational (NAEP 25.2 percent, present 15 percent), grammatical (NAEP 22.1 percent, present 2 percent), cosmetic (NAEP 12.4 percent, present 3 percent) and organizational revisions (NAEP 6.6 percent, present 0 percent). Thus, the NAEP study results suggest an even higher proportion of different revisions made in its study than with the present study's computer-assisted results. The one exception was the mechanical revisions where both studies had about the same proportion.

b) Paper and Pen Text Revisions.

The results, as indicated in Table VI show that of all the revisions which were identified 21 percent were holistic, 20 percent were cosmetic, 20 percent were informational, 20 percent were continuational, 10 percent were mechanical, 7 percent were stylistic, 1 percent were grammatical, 1 percent were organizational and 0 percent were transitional revisions.

When comparing the results of the pen and paper revisions in this study with those revisions made by the large sample of nine year old students in the NAEP study, the differences as indiaated in Table VI are interesting. It must be pointed out that the age of this study's

students was about a year older than the students of the NAEP study, that the NAEP students wrote a report rather than a story and only had one brief thirteen minute period of time to revise their writing. Keeping these differences in mind, the comparison between this study and the NAEP study revealed that a higher percentage of the total revisions were made by the NAEP students in the categories of mechanical (NAEP 27.6 percent, present study 10 percent), stylistic (NAEP 25.8 percent, present study 7 percent), informational (NAEP 25.2 percent, present study 20 percent), grammatical (NAEP 22.1 percent, present study 1 percent), organizational (NAEP 6.6 percent, present 1 percent) and transitional revisions (NAEP 6.1 percent, present 1 percent). However, students in this study made a higher proportion of revisions in the categories of cosmetic (present 20 percent, NAEP 12.4 percent) and holistic revisions (present 21 percent, NAEP 3.6 percent). Continuational revisions were about the same proportion (NAEP 20.4 percent, present 20 percent) in each study's results.

Although only 60 percent of the nine year old students actually revised their reports, it was found that the NAEP students generally made a higher proportion of most kinds of revision than the students of this study with the exception of cosmetic, holistic and continuational types of revision.

c) Differences and Similarities

By comparing the paper and pen revisions with the computer revisions, a number of differences were found. One difference was that cosmetic revisions made with paper and pen (20 percent) were over six times as frequent as there were with the computer (3 percent). A second difference was that there were more than triple the percentage of mechanical revisions made with the computer (31 percent) than with paper and pen revisions (10 percent). Thirdly, there were no holistic changes made on the computer, but 21 percent of the pen and paper revisions were of this kind.

The data also showed some similarities between revisions made with paper and pen and revisions made with the computer. First, the percentage of cosmetic revisions made with the computer (24 percent) were about the same as the percentage of cosmetic revisions made with paper and pen (20 percent). Secondly, there were very few grammamatical revisions made on the computer (2 percent) or with paper and pen (1 percent). Thirdly, continuational changes were about the same on the computer (16 percent) as with paper and pen (20 percent). Thirdly, the computer-assisted texts had a small percentage of transitional revisions (3 percent) and there were none identified with paper and pen. Fourthly, the informational revisions for both writing conditions were similar

(computer 15 percent, paper and pen 20 percent). As well, stylistic revisions for both conditions were almost equal (computer 9 percent, paper and pen 7 percent). Lastly, there were no organizational changes on the computer and almost none with paper and pen (1 percent).

In summary, the major differences found between the two different conditions were with mechanical and holistic revisons. There was a substantially higher proportion of holistic revisions made with paper and pen texts and there was a considerably higher percentage of mechanical revisions made on the computer-assisted texts. A subcategory of cosmetic revisions, "technological revisions", was identified to describe cosmetic changes made on the computer.

Both the computer and the paper and pen texts showed similar cosmetic revisions and small percentages of continuational, informational and stylistic revisions. There were similarily very infrequent grammatical, transitional, or organizational revisions in either writing condition.

2. Classifications of Revisions During Second Session

This section reports the revisions made by the twelve study students to their initial text only during the second session of writing. The first section reported above was more global in that both revisions made to the initial and second session's texts were reported and summarized. The

results of the revisions made only on the initial session's text were again classified using the categories of the National Assessment of Educational Progress (1977) and the results are reported in Table VII on page 120 in Appendix C.

a) Computer-Assisted Text Revisions

The results showed that of the total percentage of all identified revisions made to the computer-assisted text, 32 percent were informational, 29 percent were continuational, 12 percent were mechanical, 12 percent were stylistic, 6 percent were transitional, 9 percent were cosmetic which includes technological revisions and 0 percent were grammatical, organizational or holistic revisions.

b) Paper and Pen Text Revisions

The results showed that of the total percentage of all identified revisions made to the paper and pen text, 34 percent were continuational, 29 percent were cosmetic, 23 percent were informational, 9 percent were mechanical, 2.5 percent were organizational, 2.5 percent were holistic and 0 percent were grammatical, transitional or stylistic revisions.

c) Differences and Similarities

By comparing the percentage of revisions under each writing condition, a number of differences between the paper and pen and computer text revisions were identified. First, cosmetic revisions made on the paper and pen text

(29 percent) were about three times as frequent as cosmetic revisions made on the computer-asssisted text (9 percent). Secondly, there was a greater percentage of continuational revisions made with the paper and pen task (34 percent) than with the computer (29.1 percent). Thirdly, there were few transitional revisions made with the computer (6 percent), but there were no such revisions made with paper and pen. As well, there was a greater percentage of informational revisions made with the computer (32 percent) than with paper and pen (23 percent). And finally, there were some stylistic revisions made on the computer (12 percent), but there were no similar revisions made with paper and pen.

There were also similarities between revisions made with paper and pen and those made on the computer. Firstly, there were about the same number of revisions made with the computer (34) as with the paper and pen condition (35). Secondly, about the same percentage of mechanical revisions made with paper and pen (9 percent) were also made on the computer (10 percent). Thirdly there were no grammamatical revisions made on the paper and pen texts or the computer texts. As well, there were no organizational revisions on the computer and only 2.5 percent were made with paper and pen. Lastly, there were no holistic revisions on the computer and only 2.5 percent were made with paper and pen.

In summary, the greatest differences in revisions to the initial text made during the second session between writing conditions were cosmetic and stylistic revisions, but there was also a high frequency of stylistic revisions made on the computer. The paper and pen texts also had a higher percentage of continuational revisions but a lesser percentage of informational and stylistic revisions than the computer texts.

Both the paper and pen texts and the computer-assisted texts showed similar but small percentages of mechanical revisions and infrequent concern for transitional, organizational or holistic revisions.

3. Classification of Revisions During Third Session

During the third session of writing, there were eleven students who revised the paper and pen text written in the second session of writing. However, there were only five students who revised their second paper and pen text during their third writing session. This was a drop of seven students from the number of students who revised their first session's paper and pen text. Again, this part of the text analysis focused on the frequency of types of revision only at one period of time, the time the students took in their third and final written session to revise the writing completed in the second writing session. The results are reported in Table VIII on page 121 in Appendix C.

a) Computer-Assisted Text Revisions

The results showed that of the total percentage of revisions identified in the computer-assisted texts, 41 percent were mechanical, 34 percent were cosmetic which included technological revisions, 10 percent were continuational, 7 percent were stylistic, 6 percent were informational, 3 percent were grammatical, 1 percent were transitional and 0 percent were organizational and holistic revisions made during the third writing session on the second session's text.

b) Paper and Pen Text Revisions

The results showed that of the total percentage of revisions identified in the paper and pen texts, 34 percent were holistic, 16 percent were informational, 13 percent were mechanical, 13 percent were cosmetic, 13 percent were stylistic, 9 percent were continuational, 2 percent were organizational and 0 percent were organizational or transitional revisions made during the third session on the second session's text.

c) Differences and Similarities

From a comparison of perceltages in each revision category between the two different writing conditions, it was found that, first of all, the number of revisions made was greater with the computer texts. Secondly, mechanical revisions made with the computer (41 percent) were about three times as frequent as those with paper and pen (13

percent). Thirdly, cosmetic revisions which included technological revisions were much more present on the computer (34 percent) than with paper and pen (13 percent). Fourthy, stylistic revisions made with paper and pen (13 percent) were about twice as frequent as compared with those same kinds of revisions with the computer (7 percent). As well, holistic revisions were evident in the paper and pen texts (34 percent), but noticeably absent in computer texts. And finally, informational revisions found in the computer texts (6 percent) were less than half the proportion found in the pen and paper texts (16 percent).

There were a number of similarities in the kinds of revisions made under both writing conditions. Firstly, there were infrequent grammatical revisions identified with the computer (3 percent) or with paper and pen (2 percent). Secondly, about the same percentage of continuational revisions were identified in the computer texts (10 percent) and in the paper and pen texts (9 percent). As well, transitional revisions identified were marginal in the computer texts (1 percent) and absent in the paper and pen texts. Finally, there were no organizational revisions identified in either writing condition.

In summary, it was found that on the second session's text there was a much greater proportion of mechanical and cosmetic revisions made on the text using the computer than made with paper and pen. In contrast, there was a

relatively larger proportion of stylistic, holistic and informational revisions made with paper and pen than with the computer on the second session of writing.

Both writing conditions had about the same small proportion of grammatical, continuational, transitional, and organizational revisions made on the second session of writing.

4. Comparison Between the First Two Session's Texts

Based on the results summarized in Table IX on page 122, a number of differences in types of revisions were observed between the first and second session of writing. Computer text shifts included: a greater proportion of mechanical revisions (31 to 41 percent), a greater proportion of cosmetic revisions which includes technological revisions (24 to 32 percent), a reduction in the proportion of continuational revisions (16 to 10 percent) and a reduction in informational revisions (15 to 6 percent) from the first to the second computer sessions of writing. The rest of the revision categories remained about the same in the computer texts. In contrast, however, paper and pen text shifts results showed: a sizeable frequency drop in continuational revisions (34 to 9 percent), an increase in frequency of stylistic revisions (0 to 13 percent) and an increase in frequency of holistic revisions (2.5 to 34 percent). The remainder of the revision categories remained at about the same frequency in

the paper and pen texts.

5. Summary

The results of the revision analysis on the texts that the students wrote under the two different writing conditions indicate that there are some major differences and similarities. Holistic revisions are consistently of a higher proportion on paper and pen texts. Mechanical revisions are of a relatively higher percentage on computer-assisted texts. Grammatical, continuational, transitional, informational, stylistic and organization revisions in both writing conditions contained similar and generally less frequent proportions.

When observing the differences in revisions between the first and second writing session, it was generally found that the relative proportion of mechanical and cosmetic revisions which included technological revisions increased more substantially on the computer text between writing sessions, while holistic revisions on the paper and pen texts increased most dramatically between writing sessions. When considering the decreases in revisions, it was found that continuational and informational revisions drop in proportion more substantially with paper and pen texts between sessions of revision than with computer texts between sessions of revisions. Generally speaking, a higher proportion of revising occurs with the second session's text than on the first session's text especially

with the computer-assisted texts, where it doubles in frequency.

F. Individual Students' Revision Analysis

Introduction

This section contains a report of revisions of two students from both school in the study. The researcher observed the revisions that these two boys made in each text condition during each writing session. Through notetaking and transcription of recorded interviews, the researcher also collected statements made by the two students about the reasons for their revisions.

The first part of this section will report each student's pen and paper revisions, computer-assisted revisions, differences and similarities of revisions between the two writing conditions and comparisons of revisions between each writing session. This data is summarized in Tables X and XI on pages 124 and 125 of Appendix D.

The second part of this section will report data comparing the two individual student's revisions with the groups' revision results and the third part of this section will present data concerning the reasons for the revisions made by the two students.

1. Individual Students' Revisions

a) Mike's Paper and Pen Revisions

Using the revision categories of the National Assessment of Educational Progress (1977), it was found that of the 63 revisions identified in his story written with paper and pen, 48 percent were mechanical revisions, 24 percent were informational, 12 percent were cosmetic, 6 percent were grammatical, 5 percent were stylistic, 3 percent were continuational, 2 percent were organizational and Ø percent were transitional or holistic revisions.

b) Mike's Computer-Assisted Revisions

The results showed that, of the 19 revisions identified in Mike's story written on the computer, 79 percent of the total revisions made were cosmetic which included technological revisions, 11 percent were mechanical, 5 percent were continuational or informational and there were no grammatical, transitional, stylistic, organizational or holistic revisions present.

c) Mike's Differences and Similarities in Revisions

There were substantial differences in revisions identified in Mike's two stories. First, there were many more revisions made with pen and paper than with the computer. Mike revised 63 times with paper and pen, but only 19 times on the computer. Secondly, most of Mike's computer-assisted revisions were cosmetic in that 79 percent of all revisions were due to the nature of the computer. Thirdly, there was a much higher proportion of mechanical revisions made with paper and pen than with the

computer. As well, there was a much higher proportion of informational revisions made with paper and pen than with the computer. Finally, there was a small proportion of grammatical revisions with the paper and pen but none with the computer.

The two major similarities between Mike's revisions under the two writing conditions were that there was an absence of transitional and holistic revisions in either writing condition and secondly, neither writing condition showed much evidence of stylistic or organizational revisions.

d) Comparison Between Writing Sessions

Under the paper and pen writing condition, Mike showed consistency between writing sessions with some types of revision, but not with other types. The number of mechanical, informational and grammatical revisions tended to increase with time (mechanical: 5, 12, 13; informational: 4, 4, 7; grammatical: Ø, 1, 3) while transitional and holistic revision remained non-existent over time. There did not seem to be any consistent pattern to cosmetic (1, 4, 3), stylistic (1, 2, Ø), continuational (Ø, 1, 1) or organizational (Ø, 1, Ø) revisions other than the tendency for the latter three to be quite consistently low.

When Mike revised on the computer, the revisions appeared to be consistent also, but quite different from

the patterns shown under the pen and paper writing condition. Mike made many cosmetic revisions which were all technological in his first writing session but the amount decreased when he finished his story at the end of the second writing session. Other kinds of revisions were sparsely represented in the first two writing sessions and totally absent during the third writing session.

e) Summary of Mike's Revisions

Mike made substantially more revisions in quantity and type under the paper and pen writing condition. The most predominant kinds of revisions made by Mike under the paper and pen condition were mechanical and informational revisions. The most predominant kinds of revisions made under the computer writing condition were cosmetic revisions of the technological kind and mechanical revisions. Mike showed some opposite patterns of revising under the two writing conditions. Mechanical, informational and grammatical revisions increased in time with the paper and pen story while mechanical and cosmetic revisions decreased with time in the computer-written story. Generally, Mike tended to increase his paper and pen revisions over time while his computer revisions decreased over time.

f) Josh's Pen and Paper Revisions

Based on the revision categories of the National Assessment of Educational Progress (1977), it was found

that of the 82 revisions identified in Josh's paper and pen story, 42 percent of his total revisions were mechanical, 24 percent were cosmetic, 20 percent were informational, 6 percent were grammatical, 4 percent were stylistic, 2 percent were continuational and transitional and 0 percent were organizational or holistic revisions.

g) Josh's Computer-Assisted Revisions

The results of Josh's computer-assisted writing indicated that of the 95 revisions identified, 37 percent of the total were cosmetic revisions primarily of the technological type, 36 percent were mechanical revisions, 11 percent were informational, 9 percent were stylistic, 3 percent were grammatical, 2 percent were continuational and transitional and 0 percent were organizational and holistic revisions.

h) Josh's Differences and Similarities in Revisions

The results indicated a number of noticeable differences between Josh's pen and paper and computer-assisted writing. First, the percentage of cosmetic revisio in the computer condition was greater than with the paper and pen writing. Secondly, there was a higher percentage of mechanical revisions identified in the pen and paper writing than in the computer writing. Thirdly, there was a greater percentage of informational revisions identified in the paper and pen condition than with the computer-assisted condition. As well, stylistic

revisions in the paper and pen text were about half the percentage of computer text revisions. Finally, there were slightly more revisions made under the computer condition than under the pen and paper condition. There were 95 revisions made with the computer and 82 revisions made with paper and pen condition.

The chief similarities in revisions between Josh's two writing conditions were in continuational (paper and pen 2 percent; computer 2 percent), transitional (paper and pen 2 percent; computer 2 percent), grammatical (paper and pen 6 percent; computer 3 percent), organizational (paper and pen Ø percent; computer Ø percent) and holistic revisions (both Ø percent).

i) Comparison Between Josh's Writing Sessions

A number of interesting patterns emerged from Josh's revisions during the three paper and pen writing sessions. First of all, Josh's mechanical (6, 11, 17) and informational revisions (2, 6, 8) increased in quantity over the three writing periods. Secondly, Josh's cosmetic (8, 6, 6), grammatical (1, 2, 2), continuational (Ø, 1, 1) and stylistic revisions (1, 2, Ø) tended to be consistent throughout the writing sessions. Finally, organizational and holistic revisions never occured over the three writing sessions.

Under the computer writing condition, the results indicated that there were a few different patterns of

revisions emerging over the writing session. One noticeable difference was the consistency of mechanical revisions over time (13, 10, 11). With the paper and pen condition, mechanical revisions kept increasing over time (6, 11, 17). A second difference was that informational revisions (4, 2, 4) under the computer condition remained consistent through the writing sessions whereas it increased over time in the paper and pen condition as noted earlier. A third difference was the decrease in cosmetic revisions over time (20, 9, 6) which included technological revisions in the computer condition. With the other types of revision, the patterns over time were about the same as the paper and pen condition. Grammatical (0, 2, 1), continuational (0, 1, 1), transitinal (0, 2, 0) and stylistic (3, 4, 1) revisions tended to remain consistently low and in similar quantity over time. As well, holistic and organizational revisions were absent.

j) Summary of Josh's Revisions

The most predominant revisions identified in Josh's paper and pen story during three periods of writing were mechanical, cosmetic and informational revisions. The most predominant types of revision identified under the computer writing condition were cosmetic and mechanical revisions, which when combined, greatly exceeded the quantity and proportion of mechanical revisions made under the pen and paper condition. There was almost a total absence of

grammatical, transiti onal, organizational and holistic revisions in either of Josh's texts.

Under the pen and paper condition, Josh increased the quantity of revisions from one writing session to the next but decreased in the quantity of revisions when using the computer. In particular, Josh's mechanical revisions increased in number with the pen and paper condition and decreased in number under the computer condition.

2. Comparison of Individuals with Group Results

In this part of the individual students' revision analysis, a general comparison of Mike's and Josh's revisions will be made with the revisions made by all students under the two writing conditions.

The most apparent difference with Mike's pen and paper revisions from the group's revisions was his much higher proportion of mechanical revisions (Mike 48 percent, all 10 percent). His most noticeable difference from the group's computer-made revisions was Mike's high proportion of cosmetic revisions which were of the technological kind (Mike 79 percent, group 21 percent).

Similar to Mike, Josh's mechanical revisions were much higher than the group's results (Josh 42 percent, all 10 percent) under the pen and paper condition. As well, Josh's cosmetic revisions which include technological revisions were higher than the group's results (Josh 37 percent, group 21 percent) although not nearly as great a

proportion as Mike's results.

Thus, in general terms, both Josh and Mike tended to accentuate the mechanical revisions especially under the computer-assisted condition, although even the mechanical revisions made under the paper and pen condition were of a higher proportion than the groups' proportion. However, it must be pointed out that Mike and Josh's revisions were under constant, close observation and that their revisions were recorded during each writing session, whereas the group's revisions were only identified from the changes made from their texts from one writing session to the next.

3. Reasons for Revisions

Based on the work of Graves (1983) in observing the problems children try to solve in writing, five categories of explanation for revisions were used to group the reasons Josh and Mike gave for revising their stories. These categories included: a concern for spelling, motor-aesthetic problems (appearance, legibility, hand coordination, etc.), meeting the conventions of written language (punctuation, capitalization, etc.), topic and sufficient information concerns and major revisions (adding and deleting information). Results are recorded in Tables XII and XIII on pages 126 and 127 in Appendix D.

a) Mike's Reasons for Revisions

Mike provided thirty-nine explanations for his paper and pen revisions during the three writing sessions. It

was found that 58 percent of all the reasons were associated with spelling, 22 percent were for major revisions, 14 percent were for motor-aesthetic reasons, 6 percent were for meeting the conventions of written language and 3 percent were topics and sufficient information concerns.

In contrast, of the 18 explanations Mike provided while under the computer writing condition, it was found that 39 percent of his reasons were associated with concerns for meeting the conventions of written language, 39 percent were for motor-aesthetic concerns, 22 percent were for spelling concerns and there were no topic and information or major revision concerns.

Hence, Mike tended to be more concerned with a variety of problems in his pen and paper story than with his computer-assisted story. Major revisions were a concern with the paper and pen writing, but were of no concern to his computer-assisted writing. Spelling concerns tended to dominate his paper and pen writing, but meeting the conventions of written language and motor-aesthetic concerns dominated Mike's computer-made writing.

b) Josh's Reasons for Revisions

Josh provided 39 explanations for revising his paper and pen story during three writing sessions. Of the total percentage of reasons for revising, Josh indicated 31 percent were for major revisions, 31 percent were for

motor-aesthetic concerns, 28 percent were for spelling concerns, 5 percent were for meeting the conventions of written language and 5 percent were for topic and sufficient information concerns.

When comparing these concepns to the 47 reasons Josh gave while revising his computer-assisted text, it was found that 30 percent of the total explanations given were for motor-aesthetic concerns, 28 percent were for major revisions, 23 percent were for spelling concerns, 19 percent were for meeting the conventions of written language and none were for topic and sufficient information concerns.

Therefore, Josh generally seemed to be concerned about his revising in the same way under both writing conditions. It may appear that Josh was concerned with meeting the conventions of written language on the computer more than with paper and pen, however Josh rewrote his entire pen and paper story during a fourth writing session although to maintain consistency with the three writing sessions of the study, it was not used in the analysis.

4. Summary

In general, Mike made more revisions with paper and pen than with computer. With paper and pen, Mike made mostly mechanical and informational revisions, while with the computer his revisions were mostly cosmetic revisions of the technological kind. Between each writing session

Mike's paper and pen revisions increased in number, while just the opposite pattern occurred using the computer.

In contrast, Josh made slightly more computer-aided revisions than with pen and paper. Mechanical revisions were the most predominant form of revision under the paper and pen condition while mechanical and cosmetic revisions which included technological revisions were about equally present on the computer. Josh, like Mike, increased the number of revisions made from writing session to writing session with paper and pen but decreased the quantity of revisions over time on the computer.

Both Mike and Josh's mechanical and cosmetic revisions were higher than the entire student group's percentage of mechanical and cosmetic revisions, and Mike's technological kind of cosmetic revisions were much higher than Josh's.

When considering their reasons for making their revisions, Mike indicated most of his concerns during his pen and paper writing were with spelling, while on the computer his concerns were more related to meeting the conventions of written language and motor-aesthetic concerns.

In Josh's case, his most frequent explanations for revising his paper and pen writing were associated with major revisions such as addition and deletion of information as well as motor-aesthetic concerns. These two concerns were also found to be the most frequent

explanations given under the computer-assisted writing.

G. Summary Of Analysis

Five different methods were used to analyze the revisions of grade five writers and the effects a word processor might have on their revisions. These included a holistic writing assessment, student and teacher questionnaires, a text analysis of two stories and a focused analysis of two students revisions throughout their writing.

The first method, a holistic writing assessment, found that the quality of stories written with the assistance of a microcomputer was judged higher than the quality of stories written by the same students using paper and pen.

The second method of the study used the written student responses from a ten-item questionnaire given to the students immediately after completion of their writing. In general, students indicated that they liked to write a great deal, make substantial revisions especially of the mechanical type regardless of whether they write with a computer or not and that they revise for a variety of reasons. These children also thought that revisions improve the quality of their writing and that getting their intended meaning across was an important reason for revising.

The third method of inquiry used the same approach as

the second method except that the perceptions of the teachers who taught the students were collected. From the questionnaires, the teachers from both schools indicated that they provided some instruction in cosmetic, mechanical, grammatical, continuational, transitional and informational revisions. In addition, students in school X received some instruction in stylistic and organizational revisions. At school Y, students received teacher and peer conferencing and used an editing reminder chart. Teachers from both schools saw revision as a means to improving their students' writing. The two teachers involved in the study at school X felt children revised their work to improve the final product and because their final product would be taken home or displayed. The teacher involved in the study at school Y indicated that teacher and peer conferencing and getting at the intended meaning were the major reasons for her students' revisions to their writing.

The fourth method took the form of analyzing the written texts of the students. Revisions were identified in the texts from the first to the third writing session. The results indicated that there was a relatively even spread of cosmetic, informational, continuational and stylistic revisions identified in the texts. There was also a higher proportion of holistic revisions made under the paper and pen condition than the computer writing condition. However, mechanical revisions were present more

frequently on the computer-assisted writings. Between writing sessions it was found that the relative proportion of mechanical revisions increased more substantially on the computer, whereas holistic revisions increased with time in the paper and pen task but were absent in the computer task. As far as decreases were concerned, the computer condition evidenced a substantially greater decrease in informational revisions, while the paper and pen condition showed a relatively greater decrease in continuational revisions. And finally, more revising occurs in both writing conditions during the first session's texts than in the second sessions texts, but the computer-assisted writing always had a higher frequency of revisions in either session of writing.

The fifth method of study focused on the revisions of two students in the study. The researcher observed each students' revisions, recorded them as they wrote and interviewed them separately to find out the reason for each of their revisions. In general, it was found that Mike made many mechanical and informational revisions with paper and pen and indicated a primary concern for spelling, whereas with the aid of a computer, Mike made far fewer revisions, the majority of them being cosmetic revisions of the technological kind. Mike expressed concern primarily for language conventions and motor-aesthetics as his reasons for revising his writing.

In Josh's case, he made more revisions than Mike did in either writing condition. Josh made mostly mechanical revisions when using paper and pen and indicated that he had major revision concerns as his reasons for his revisions. Under the computer writing condition, Josh made a high number of mechanical and cosmetic revisions which included technological revisions but indicated the same kind and frequency of concerns for revising as in the paper and pen writing condition.

Thus the two students provided a more detailed account of revisions and reasons for revisions in this aspect of the study.

CHAPTER V

SUMMARY, MAJOR FINDINGS, CONCLUSIONS AND IMPLICATIONS

This chapter contains a summary of the study, major findings, conclusions and implications of the study for instruction and further research.

A. Summary

The purpose of this study was to investigate the nature of students' revisions and their corresponding strategies while they composed narrative discourses using a word processor program. Twelve students wrote one story using pen and paper and one story with the Bank Street Writer word processor program during three forty minute periods. Two subjects were observed and interviewed during each writing session. Student and teacher questionnaires were completed after all writing sessions were finished.

After all the data was collected, a holistic writing assessment was completed by two trained judges of the final copies of the paper and pen and computer-made compositions. This was followed by an analysis of the revisions made in each writer's text during the three, forty minute periods assigned to both writing conditions. Using the revision categories of the National Assessment of Educational Progress (1977) as a guide, each student's revisions were counted and classified and reported by frequency and

percentage figures. The data obtained from the student questionnaires were also analyzed by classifying student responses in terms of frequencies and percentages. As well, teacher questionnaire data was summarized and reported. Finally, the revisions and reasons for revisions of two subjects, under direct observation and questioning of the researcher, were tallied, classified into categories and reported by frequencies and percentage figures.

B. Major Findings

The major findings of the study are reported according to the four research questions presented in Chapter I.

1. Question: What are the revision strategies of grade five students writing in the narrative mode using a word processor program?

According to the student questionnaire data, most students perceived themselves as writing a great deal, revising frequently especially with mechanical revisions and provided a variety of reasons for their revisions. The explanation of getting across their intended meaning was the most frequent reason stated for their revisions made with the assistance of a computer.

Teachers indicated that most of their students primarily make cosmetic, mechanical,transitional, grammatical and stylistic revisions and that their students revise primarily to improve their writing, get across their

intended meaning.

The results of the text analysis showed that students made a higher frequency of mechanical revisions on the computer than with paper and pen, the frequency of which increased in number from the first to last writing session. As well, there was a higher frequency of revisions made with the computer than with the paper and pen writing condition.

Based on the results of the analysis done on the two subjects who were observed and interviewed, it was found that one student made mostly cosmetic revisions such as typographical or editor-command mistakes. This student expressed that his reasons for revision were due primarily to language conventions and because of motor-aesthetic concerns. In contrast, the other student made a substantially greater number of revisions on the computer than the first student. The second subject made a high number of mechanical and cosmetic revisions including technological revisions and indicated that his reasons for revising were primarily major revision concerns such as the addition or deletion of information.

In summary, the revision strategies of grade five writers while composing with a computer were making a great deal of revisions, especially with mechanical revisions, for a variety of reasons but most predominantly to get across their intended meaning. The two observed subjects,

however, expressed maintaining language conventions, motor-aesthetic concerns and major informational concerns as their reasons for revising their computer-assisted texts.

2. Question: What are the revision strategies of the same grade five students when writing in the narrative mode using a pen and paper method?

The results of the student questionnaire data indicated that these children made predominantly mechanical revisions similar to the computer condition of writing and said that they revised their written work most frequently to get across their intended meaning.

Teachers of the students in the study indicated from their questionnaire responses that their students revised to improve their final product, to make it better for parents and peers to read, to express their intended meaning and that they revised as a result of teacher and peer conferencing.

From the text analysis, it was found that there was a much higher percentage of holistic revisions which increased in frequency over writing sessions while continuational revisions decreased in frequency over time.

From the individual revisions analysis, it was found that one student made many mechanical and informational revisions and he expressed a primary concern for spelling, whereas the other student also made many mechanical

revisions but indicated that he had major revision concerns as his primary explanation for the revisions which he made.

The primary reasons these grade five students indicated while composing in the narrative mode were to improve their written product, make it better to read and to express their intended meaning as indicated from the questionnaires. The text analysis showed a substantial frequency of holistic, cosmetic, informational and continuational revisions. Concerns for spelling and major informational revisions were indicated from the observed subjects.

3. Question: What similarities and differences exist in the revision strategies of the grade five writers with computer-assisted writing and with the use of pen and paper?

a) Similarities

Based on the student questionnaire data, students indicated that the most frequent kinds of revising were mechanical revisions in either writing condition. It was also found that the most frequent reason stated for revising their written or computer-aided compositions was to get across the author's intended meaning.

The text analysis indicated three general similarities between revising with pen and paper and revising with the assistance of a computer. First, there were similar percentages of cosmetic revisions made under both

conditions. Seconly, there were small percentages of continuational, informational and stylistic revisions and thirdly, there were very infrequent grammatical, transitional or organizational revisions with either writing condition.

The individual student analysis showed that both subjects were moderately concerned about motor-aesthetic problems when revising with the aid of a computer. One of the students indicated about the same kind and frequency of reasons for revising which were primarily motor-aesthetic and major revision concerns.

Finally, the teachers of both schools indicated that their students revised to improve their writing.

b) Differences

While the teacher and student questionnaire analysis did not show much difference between the kinds or reasons for revision, the text analysis did identify differences. One difference was the much greater frequency of mechanical revisions made on the computer than with the paper and pen condition. Another main difference was that there were no holistic revisions made on the computer, but there was a significant frequency of them made with pen and paper.

The individual subject's revision analysis also yielded substantial differences between the two writing conditions. One student made far more revisions with paper and pen than with computer. When using the computer he

made mostly cosmetic revisions of the technological kind, while with pen and paper he made mostly mechanical and informational revisions. In contrast, the other student made more revisions than the first student, but the types of revision the second student made were not substantially different under either condition.

When considering their reasons for revisions, the first student indicated a high concern for spelling when using the computer but expressed primarily language convention and motor-aesthetic concerns with the pen and paper revising. In contrast, the second student maintained about the same frequency of motor-aesthetic and major revisions under both writing conditions.

In summary, the similarities found between the revision strategies of paper and pen and computer-assisted compositions were a high frequency of mechanical revisions made to get across the writer's intended meaning, a low frequency of continuational, informational and stylistic revisions, an infrequent number of grammatical, transitional or organizational revisions and a desire to improve their writing. The primary differences between the revision strategies of pen and paper and computer-assisted compositions were a high frequency of holistic revisions made with paper and pen, a higher frequency of mechanical revisions made on the computer, the absence of holistic revisions on the computer and the substantial frequency of

technological kinds of cosmetic revisions on the computer.

4. Question: What effect do revision strategies using a word processor program have on the general quality of grade five narrative compositions?

The holistic writing analysis reported that most of the students' computer-assisted narrative compositions were judged better than their corresponding pen and paper narrative compositions using a four point scale. Interestingly enough, it was found, however, that the only two computer-assisted narrative compositions that were rated less than their corresponding pen and paper narrative compositions were composed by two students who had received the highest pen and paper scores of all the students in the study.

C. Conclusions of the Study

The purpose of this study was to explore the nature of revision strategies of grade five writers when they compose on a word processor. Consequently, the revisions of twelve students were identified from their written texts and two of these students were interviewed to obtain the reasons for their revisions. This was followed by analyses of student and teacher questionnaire data, a holistic writing assessment of two narrative compositions, one written with pen and paper and the other written with a computer and analyses of the revisions and reasons for revisions of the

two interviewed subjects. The following conclusions were made based on the major findings of the study:

1. Grade five students who compose in the narrative mode revise more with a word processor than with paper and pen. Since the quality of writing may be improved through revision, revising on a word processor may enhance the quality of upper elementary writers' narrative discourse.

2. Grade five students who compose in the narrative mode write better narratives using a word processor than with pen and paper as measured by a holistic writing assessment using a four point scale. Since revising is an important part of the writing process and word processors encourage revisions, then there is the suggestion that revising on a word processor will help improve the quality of upper elementary students writing.

3. Grade five students who compose in the narrative mode tend to make mechanical revisions more frequently than any other kind of revision regardless of whether they write with pen and paper or with the assistance of a word processor. It appears that grade five children tend to revise the spelling, punctuation, capitalization and paragraphing of their writing most frequently regardless of the whether the student uses paper and pencil or a computer.

4. Grade five students who write their narrative compositions on a computer using a word processor tend to make technological revisions. These kind of revisions are related to the nature of the hardware and software used and might possibly be reduced through typing instruction and more practice with the word processor program.

5. Grade five children composing in the narrative mode have a variety of reasons for making their revisions regardless of whether they use pen and paper or a computer to transcribe their compositions. These grade five children indicated that they revised to get across their intended meaning, because they were aware of an audience, because they were concerned about the appearance or meeting the conventions of language and they revised for very specific intentions such as making the writing more exciting or to learn more.

6. Grade five children who compose on a computer with the word processor program do not make major kinds of revisions such as organizational or holistic revisions. Since these kinds of revisions were not present, even though it is possible to do them with the word processor program in this study, it may be suggested that these grade five children have little, if any, knowledge, skill or practice in revising in these ways on the computer.

7. Grade five children who compose in the narrative mode

on a computer tend to make more mechanical revisions with a computer than with pen and paper. It seems likely that the nature of the word processor lends itself to making more of these kinds of revisions than with paper and pencil.

8. Some grade five writers compose better narrative compositions with pen and paper than with the assistance of a computer. It is suggested that some children, regardless of their computer experience, may write better stories in a pen and paper environment for a variety of individual reasons.

D. Implications of the Study

Two types of implications will be included in this section of Chapter V. The first part will provide instructional implications while the second part will relate to suggestions for further research.

1. Implications for Instruction

a) There is evidence from this study to support the notion that microcomputers with simple word processors encourage revision in writing and improve the holistic quality of grade five students' narrative compositions. Thus, some elementary students are likely to improve their writing if they have experience using word processor programs.

b) This study suggests that grade five writers have

common revision strategies which they bring to their composition tasks regardless of the method of writing used. Therefore, teachers should not assume that the use of computers or word processor programs necessarily imply major differences in revision strategies.

c) This study suggests that holistic and organizational kinds of revisions are may not be used by grade five students writing with a simple word processor and therefore, students should be given instruction and experience in applying them to their computer-assisted compositions.

d) Teachers should be aware that grade five writers will substantially differ in the frequency and kind of revision strategies used regardless of whether they write with pen and paper or with a computer.

2. Suggestions for Further Research

Since research in studying the effects of a word processor upon the revision strategies of upper elementary school children is scarce, the following suggestions for further research are recommended:

a) A replication of the present study to affirm the results found in this study would be useful

b) If the revision strategies of students in different grades were studied under similar conditions, the possibility of a developmental influence on revision strategies might be determined.

c) If the number of writing episodes were increased and the researcher observed the student's revisions on a daily basis rather than a weekly basis, a more comprehensive set of results might be revealed.

d) This study did not investigate the influence that the instructor might have on the revision strategies of grade five writers using a word processor. This kind of study is certainly necessary for future investigation.

e) It would be valuable to explore other methods of determining the reasons why children actually revise besides simply asking them. Bridwell, Nancarrow and Ross (1984) are now studying the use of two programs which they designed to replay on the screen any part of the writer's composition for revision analysis.

f) By connecting a VCR to the computer, it is possible to record every revision made by the writer using a word processor. A study using this equipment would be valuable.

E. Concluding Statement

This study explored the effects of a word processor upon the revision strategies of grade five students composing in the narrative mode. Twelve students were used in this exploratory study and two of the subjects were involved more directly by close observation of their revisions and interviewing which was used to identify their reasons for revising. Revisions and revision strategies

were identified and compared under computer-assisted and pen and paper writing conditions. After three forty-minute periods of composing under the two writing conditions, the students' revisions and strategies were analyzed and a holistic assessment of the students' compositions was completed.

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APPENDICES

APPENDIX A: HOLISTIC DATA

TABLE I: HOLISTIC ASSESSMENT RESULTS

Table I Holistic Scoring Results

Pen and Paper Results			School and Student	Computer Results		
Scorer 1	Scorer 2	Total Score		Scorer 1	Scorer 2	Total
2	1	3	X1	2	2	4
4	4	8	X2	3	3	6
2	1	3	X3	2	3	5
2	2	4	X4	3	3	6
2	2	4	X5	3	3	6
3	2	5	Y1	3	3	6
2	1	3	Y2	3	2	5
3	2	5	Y3	3	3	6
3	3	6	Y4	4	4	8
4	4	8	Y5	3	2	5
3	2	5	Y6	4	4	8
2.7	2.2	6.0	Average Score	3.0	2.9	7.2

APPENDIX B: STUDENT QUESTIONNAIRE DATA

TABLE II: REASONS WHY STUDENTS LIKE TO WRITE PROFUSELY

TABLE III: REASONS WHY STUDENTS DO NOT LIKE TO WRITE PROFUSELY

TABLE IV: REVISIONS TO WRITTEN WORK AS INDICATED BY STUDENTS ON THE QUESTIONNAIRE

TABLE V: COMPUTER-AIDED REVISIONS AS INDICATED BY STUDENTS ON THE QUESTIONNAIRE

Table II Reasons Why Students Like To Write Profusely

1. because of our writing program.
2. I like to use my imagination.
3. It keeps me busy.
4. It's fun.
5. I get better marks.
6. It's almost like reading but I can choose my ending.
7. It's fun.
8. It's a way of expressing your imagination.
9. It's fun.
10. It's interesting.
11. I like to read it when it's done.
12. It gives me something to do.
13. I like to write when I'm bored.
14. It makes me go on adventures.
15. when I can write about something I know.
16. It takes all my time up.
17. It gives me knowledge.
18. It helps me relax.
19. It calms me down when I'm mad.
20. It helps me think.
21. It's fun.
22. I like to write a lot.
23. It let's you get rid of secrets from yourself.
24. I like to make up stories when I'm bored.
25. It let's my mind wander and dream.
26. I like to express different kinds of writing.
27. It's fun.
28. It exercises your hands.
29. It's fun making up your own stories.
30. I like to be creative.
31. I like to write because I like to read.

Table III Reasons Why Students Do Not Write Profusely

1. I would prefer to write computer programs.
2. I don't like to write about things I know little about
3. It takes all my time.
4. I can't think of anything to write about.
5. It's boring.
6. I can't write a good story.
7. My writing is untidy.
8. It's painful to my hand.
9. It's a waste of time because it hurts your fingers.
10. It just isn't my favorite thing to do.

Table IV Revisions To Written Work As Indicated By Students On The Questionnaire

Response	Frequency	NAEP Revision Category	Percent
Spelling	20		
Punctuation	10	Mechanical	64%
Capitalization	6		
Paragraphing	1		
Does not look right	1		
Letter formation	2	Cosmetic	9%
Erasing messy writing	2		
Wrong tense	1		
Does not sound right	3		
Does not make sense	1	Grammatical, Transitional or Stylistic	20%
Things I don't like	1		
Changes to words	4		
General mistakes	2		
Deletes words,phrases	1	Continuational or Informational	7%
Addition of words	3		
Total	58		100%

Table V Computer-aided Revisions As Indicated By Students On the Questionnaire

Response	Frequency	NAEP Revision Category	Percent
Spelling	13		
Paragraphing	4		
Punctuation	3	Mechanical	50%
Capitals	2		
Words and sentences that do not sound right	3		
Sentences	2		
Words that do not make sense	1	Transitional Grammatical	
Words	1	or Stylistic	18%
Tense	1		
Numbering and rewriting lines	2		
Variable changes	1		
Mistakes	4		
Letters	1	Cosmetic	11%
Computer changes	1		
Typing errors	1	(Technological)	14%
Making new lines	1		
Subtotal	11	Total Cosmetic	25%
Deletion of words	2	Continuational or Informational	7%
Addition of words	1		
Total	44		100%

APPENDIX C: TEXT REVISION DATA

TABLE VI: CLASSIFICATION OF TOTAL REVISIONS

TABLE VII: CLASSIFICATION OF SECOND SESSION'S TEXTS

TABLE VIII: CLASSIFICATION OF THIRD SESSION'S TEXTS

TABLE IX: REVISION PERCENTAGE COMPARISON BETWEEN WRITING SESSIONS

Table VI Classification Of Total Revisions

	WRITING CONDITION				
	Computer Sessions		Pen and Paper Sessions		NAEP
Number of Students in study	Initial 12	Second 11	Initial 12	Second 5	2400
	Total	Percent of Total	Total	Percent of Total	Percent
Types of Revision					
Cosmetic	3	3	16	20	12.4
Technological	22	21	-	-	-
Subtotal	25	24	16	20	12.4
Mechanical	32	31	9	10	27.4
Grammatical	2	2	1	1	22.1
Continational	17	16	16	20	20.4
Transitional	3	3	0	0	6.1
Informational	15	15	16	20	25.2
Stylistic	9	9	6	7	25.8
Organizational	0	0	1	1	6.6
Holistic	0	0	16	21	3.6
Total	103	100%	82	100%	100 %

Table VII Classification of Second Session Revisions

	WRITING CONDITION			
	Computer		Paper and Pen	
Number of Students				
	Total Revisions	Percent of Total	Total Revisions	Percent of Total
Revision Types				
Cosmetic	1	3	10	29
Technologocal	2	6	-	-
Subtotal	3	9	10	29
Mechanical	4	12	3	9
Grammatical	0	0	0	0
Continuational	10	29	12	34
Transitional	2	6	0	0
Informational	11	32	8	23
Stylistic	4	12	0	0
Organizational	0	0	1	2.5
Holistic	0	0	1	2.5
Total	34	100%	35	100%

Table VIII Classification of Third Session Revisions

	WRITING CONDITION			
	Computer		Pen and Paper	
Number of Students	11		5	
	Total	Percent of Total	Total	Percent of Total
Revision Types				
Cosmetic	2	3	6	13
Technological	20	29	-	-
Subtotal	22	32	6	13
Mechanical	28	41	6	13
Grammatical	2	3	1	2
Continuational	7	10	4	9
Transitional	1	1	0	0
Informational	4	6	8	16
Stylistic	5	7	6	13
Organizational	0	0	0	0
Holistic	0	0	16	34
Total	69	100%	47	100%

Table IX

Revision Percentage Comparison Between Initial and Second Writing Sessions

	WRITING CONDITION			
	Computer Text		Pen and Paper Text	
	Initial	Second	Initial	Second
Percent of Total Revisions				
Cosmetic	3	3	29	13
Technological	21	29	-	-
Subtotal	24	32	-	-
Mechanical	31	41	9	13
Grammatical	2	3	Ø	2
Continuational	16	10	34	9
Transitional	3	1	Ø	Ø
Informational	15	6	23	16
Stylistic	9	7	Ø	13
Organizational	Ø	Ø	2.5	Ø
Holistic	Ø	Ø	2.5	34
Total	100%	100%	100%	100%

APPENDIX D: INDIVIDUAL REVISION DATA.

TABLE X: MIKE'S REVISIONS DURING THE WRITING

TABLE XI: JOSH'S REVISIONS DURING THE WRITING

TABLE XII: MIKE'S REASONS FOR REVISIONS

TABLE XIII: JOSH'S REASONS FOR REVISIONS

Table X Mike's Revisions During The Writing

Category of Revision	Writing Condition Sessions															
	Pen and Paper								Computer							
	1st	%	2nd	%	3rd	%	Tot.	%	1st	%	2nd	%	3rd	%	Tot.	%
Cosmetic	1	9	4	16	3	11	8	11	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Techno-logical	-	-	-	-	-	-	-	-	9	92	6	75	Ø	Ø	15	79
Subtotal	1	9	4	16	3	11	8	11	9	92	6	75	Ø	Ø	15	79
Mechanical	5	45	12	48	13	48	30	48	2	18	Ø	Ø	Ø	Ø	2	11
Gramma-tical	Ø	Ø	1	4	3	11	4	6	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Continua-tional	Ø	Ø	1	4	1	4	2	3	Ø	Ø	1	13	Ø	Ø	1	5
Transi-tional	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Informa-tional	4	37	4	16	7	26	15	24	Ø	Ø	1	13	Ø	Ø	1	5
Stylistic	1	9	2	8	Ø	Ø	3	5	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Organiza-tional	Ø	Ø	1	4	Ø	Ø	1	2	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Holistic	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Total	11		25		27		63		11		8		Ø		19	

(%: percent, 1st: first, 2nd: second, 3rd: third, tot.: total)

Table XI Josh's Revisions During The Writing

Category of Revision	Writing Condition Sessions															
	Pen and Paper								Computer							
	1st	%	2nd	%	3rd	%	Tot.	%	1st	%	2nd	%	3rd	%	Tot.	%
Cosmetic	8	44	6	22	6	17	20	24	2	5	0	0	0	0	2	2
Techno-logical	-	-	-	-	-	-	-	-	18	45	9	30	6	24	33	35
Subtotal	8	44	6	22	6	17	20	24	20	50	9	30	6	24	35	37
Mechanical	6	33	11	39	17	47	34	42	13	33	10	33	11	44	34	36
Gramma-tical	1	6	2	7	2	6	5	6	0	0	2	7	1	4	3	3
Continua-tional	0	0	1	4	1	2	2	2	0	0	1	3	1	4	2	2
Transi-tional	0	0	0	0	2	6	2	2	0	0	2	7	0	0	2	2
Informa-tional	2	11	6	21	8	22	16	20	4	10	2	7	4	16	10	11
Stylistic	1	6	2	7	0	0	3	4	3	7	4	13	1	4	8	9
Organiza-tional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holistic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	18		28		36		82		40		30		24		95	

(%: percent, 1st: first, 2nd: second, 3rd: third, tot.: total)

Table XII Mike's Reasons for Revisions

Reasons	Writing Condition															
	Pen and Paper Sessions								Computer Sessions							
	1	%	2	%	3	%	Tot.	%	1	%	2	%	3	%	Tot.	%
Spelling	2	22	9	70	9	64	20	56	4	31	0	0	0	0	4	22
Motor	0	0	2	15	3	21	5	14	5	38	2	40	0	0	7	39
Conven-tions	2	22	0	0	0	0	2	6	4	31	3	60	0	0	2	39
Topic	1	11	0	0	0	0	1	3	0	0	0	0	0	0	0	0
Major changes	4	45	2	15	2	15	8	22	0	0	0	0	0	0	0	0
Total	9		13		14		36		13		5		0		18	

(%: percent, 1: first, 2; second, 3: third, Tot.: total)

Table XIII Josh's Reasons for Revisions

Reasons	Writing Condition															
	Pen and Paper Sessions								Computer Sessions							
	1	%	2	%	3	%	Tot.	%	1	%	2	%	3	%	Tot.	%
Spelling	2	25	2	17	7	37	11	28	2	11	4	29	5	33	11	23
Motor	3	37	3	25	6	32	12	31	7	39	4	29	3	20	14	30
Conven-tions	0	0	2	17	0	0	2	5	5	28	1	7	3	20	9	19
Topic	0	0	1	8	1	5	2	5	0	0	0	0	0	0	0	0
Major changes	3	37	4	33	5	26	12	31	4	22	5	35	4	27	13	28
Total	8		12		19		39		18		14		15		47	

(%: percent, 1: first, 2: second, 3: third, Tot.: total)

APPENDIX E: STUDY PROCEDURES AND SAMPLES

STUDY PROCEDURES AND SAMPLES	PAGE
1. LETTER TO PARENTS	129
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9. COMPUTER-ASSISTED WRITING BY MIKE	143
10. REVISION CATEGORIES USED IN STUDY	145

Room 441 Ed.S.
Dept. of Elem. Ed.
University of Alberta
Edmonton, Alberta
T6G 2G5
February 6,1985

Dear Parent:

This letter is a request for permission to involve your child in my research study between approximately February 13 and March 20th, 1985 at your child's school.

The research study is an investigation of the effects of a word processing program (Bank Street Writer) upon the revisions of grade five students. Basically, the study compares the written revisions of students writing on a microcomputer with their writing using paper and pen.

I will be observing the writing and revisions, interviewing the students to find out why they revised and having them complete a questionnaire about their revisions when the tasks are completed.

This study will occur during the regular program of the school and should not interfere significantly with the students regular course of studies.

Your child's teacher and principal are aware of the research study proposed and endorse it. However, your approval is required for your child's particiation. Please indicate on the tear-off form below your desire for your child's involvement in this study. Please return the form to the school at your earliest convenience. If you require further information, please don't hesitate to call me at 432-5123.

Sincerely,

Randy Kopp

I give my child,_____, permission to participate in the research study conducted by Mr. Kopp at my child's school.

_____ _____
Date Signature of Parent

TEACHER RESPONSIBILITIES IN THE STUDY

The role of the teacher in this study will be:

1. Assign and supervise the composing of two different narrative tasks, one with paper and pen and one with a microcomputer according to the "Instructions for Students" standardized by the researcher.

2. Select and release two fluent writers for interview purposes during the two writing tasks.

3. Complete a brief questionnaire concerning the revisions of grade students.

INSTRUCTIONS TO STUDENTS

A. Directions for Students "starting" with the computer

1. Mr. Kopp, from the University of Alberta, is here to observe the changes you make when you write two different stories.

2. Your name has been printed on the disk you will be using so you do not have to type your name on the file.

3. Write a story on the computer using the Bank Street Writer Program.

4. You will be expected to make any changes in your story that you think are necessary to write a good story.

5. When completed, your story may be taken home and shown to your parents to read, but the story will not be read by your teacher.

6. You will be allowed approximately three periods (of about 40 minutes each) to complete your story. If you need more time, please let me know.

7. To help you with the choice of your story you may select one picture from those shown to you in a moment or you may use your own ideas as long as you write a story from your ideas.

8. A blank disk has been initialized and placed in your disk drive. Please give your story a title and save what you write immediately.

9. You will be permitted to make a print out of your story

after you have completed your initial attempt. Please let me know when you are ready to do this. I will give you a pen to change anything you feel needs changing. You may make more print outs to see any other changes you may wish to make.

10. If you have any questions, please raise your hand and I will try to answer them. Remember, you have three periods so you do not have to rush. Just write a good story. Good luck!

B. Directions for Students starting with the paper and pen task first.

1. Mr. Kopp from the University of Alberta is here to observe the changes you make when you write two different stories.

2. Your name has been printed on a card with the paper you will receive to write your story on. Therefore, do not write your name on the paper given to you.

3. Write a story with the paper and a pen. If you don't have a pen, raise your hand and I'll see that you get one.

4. You will be expected to make any changes in your story that you think are necessary to write a good story.

5. When completed, your story may be taken home for your parents to read but the story will not be read by your teacher.

6. You will be allowed approximately three periods (of about 40 minutes each) to complete your story. If you need more time, please let me know.

7. To help you with the choice of your story you may select one picture from those shown to you in a moment. However, if you have your own ideas for writing a story, you may also use those ideas instead.

8. You may title your story at the top of the first page you start with.

9. After your initial attempt at your story, use another colored pen or a pencil to make any changes you feel are necessary. It is important that you let me know when you are finished your initial attempt. You may rewrite your paper as often as you need to.

10. If you have any questions please raise your hand and I will try to answer your questions. Remember, you have three periods so you do not have to rush. Just write a good story. Good luck!

Sample Interview Notes

1 1,2 Josh Lans. 2/20/85 11:25 12:05 C CL1

Draft Page Name School Date Start Finish Mode Code

PG	LN	INITIAL	INTER	FINAL	REASON	NOTES
1	1	The toy that...		The Toy That...	I just wanted the first letters capitalized.	Josh used delete key
1		boy;, his		boy, his name	I didn't want name	the semi-colon.
		op		play	I just hit the wrong key.	
		bo;y		boy	I'm not used to these sensitive keys. My mom's typewriter is...	Josh asks if spaceship is all one word.
		je thought		He thought	Maybe ... too close to key, I don't know.	
		thek		the		
1	4	spaceship, he made; it with		spaceship he made it with		Josh asks Ricky the name of a building block set.
1	5	cor Constr		Construcs	Ah, a capital	Josh used the edit mode to insert a sentence.
1		true		true.	I put in a period.	
1	8	nnight		night	I erased the n.	

TRANSCRIPTION: "c11" DATE: Feb.20,1985 SUBJECT:Josh

EXPLANATION OF CODE: I:interviewer's remarks S:student's remarks T:teacher's remarks
NOTE: The dots ..... represent pauses in and unidentifiable speech.

I: You put in a semicolon there
S: Oh that's a comma
I: You didn't want the semicolon
S: No

I:Ok,I see that you ...Was that cause you hit the wrong key?
S:Yah
I:Okay, what happened next?
S:.....

I:What happened there?
S:I knocked ah, like ah.....with these keys, you just barely touch them and...
I:Oh, I see, they are really sensitive..

S:I have a hunch these computers are really old....
I:You can.....bang it just to make it,yah..I don't want to ....don't get me wrong...I'm not trying to criticize you, all I'm doing is trying to watch what you're doing ...I just want to.....But whatever ...Okay?
S:....

S:Spaceship all one word?
I:Pardon me?
S:Is spaceship one word?
I:Yes, that's right

I:I'm trying to realize why you changed that. You had "je" up there, but you do....What....what do you think caused that? I'm just curious.
S:I just hit the j.....j.....
I:You were so close to the "h" ?.....
S:j..j..instead of l...well..I'm not
I:I know, its kind of reaction.....Don't worry about it. But I'm just curious.

S:.....

I:Do you want to stop here?.....I've noticed that you.....changed "toys to "set". Why did you do that?
S:Because when I read the sentence, it didn't sound .....it didn't sound right.
I:Oh, okay

I:Stop here,for a second.....You inserted "Tony" there.....Is there a reason why you did that?
S:Because I'm always saying "he" and .....
I:Oh I see,..so you wanted to give the name stead of .....
S:I wanted a change .....
I:Thanks

I:What happened there?
S:I forgot to press the ESCape.....so you can't type in this mode..
I:Ohh!

S:Is that spelled right?
I:No, I don't think it is.. I think have got to have an "i" in there.....Does that look better?
S:Yup

I:Josh, you.....I'm going to stop you again. Here you said that he "saw" and then you changed it to "said"....
S:Yah,I put it in the word above at the same time ...
I:Oh, I see, so you just put in the word above it.....

I:Stop Josh. I am going to stop you again. Here you had "saved" and then you changed it to"same". Is there a particular reason why you changed that?
S:Well,..I..did the wrong thing ..I missed .....I'm so used to saving.....You know that you have to save that .....
I:Yes, I am familiar with that. That's right.....Okay, good.

I:How did you insert that .....you put in "it was now also .....What made you think....
S:Well, I put that in because I didn't want to write words that.....
I:Okay

I:.....

T:I'm sorry, Mr.Kopp do you want them to save it under their title?
I:Ah,they can.. If they have a title, Yes, it would be good to save under that title...
T:They have it under their own title.
I:It doesn't matter. Whatever is convenient for them.
T:Save it under what you want,okay.

I:Josh, can I just catch you for a few minutes for a few questions. One of the questions is "How did you go about writing this...How did you actually go about writing this?
S:Well, I just.....
I:What did you...like did you have a plan..or...

S:plus I looked at the picture and thought .....the recipes.....and I just thought of the.....
I:Okay, let me ask you another question. What are you going to do next with this?
S:Continue on writing .....until...after it sounds..good
I:Okay
S:....get a print out..
I:Okay and one more question. What do you think of your piece? Right now what do you think of it?
S:It looks like a pretty.....story full of fantasy.....
I:Thanks very much. What you have allowed me to do has really helped my study I hope .....not because.....I appreciate it.....so we got it saved,right?
S:Yah
I:So I guess we'll continue where we left off next day.....I guess there is another question if we've got an other minute. You basically were looking back quite a bit weren't you? Like after you wrote a paragraph or a sentence? Did you actually go back..Is that what you were.....because there were times when just sat there... you were thinking about something....What were you doing when you were .you know.....Were you just thinking.....
S:.....see if there were anything ..... in the sentences.....
I:But you did look back because obviously you went back up....to put some insertions in...you added some stuff..Okay, thanks alot.

Page One TEACHER QUESTIONNAIRE

Name of Teacher:_____ Date: _____

1. What kinds of strategies have you taught your students with regard to the revision of their writing compositions? To help you answer this question on the attached page are listed nine categories of revision used by the National Assessment of Educational Progress (1977).

2. What kind of strategies are your students using when they revise their texts?

3. What reasons do you think your students have for revising their text?

4. Why do you think revisions in grade five writing are important?

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS (1977): Nine Categories of Revision

1. Cosmetic: changes in appearance of legibility of the original report.

2. Mechanical: changes in spelling, punctuating, underlining, paragraphing and capitalization.

3. Grammatical: changes to fit grammatical conventions like subject/verb or antecedent/pronoun..

4. Continuational: changes which include the addition of a word, phrase, sentence or section to the end of the original report.

5. Transitional: changes which include the addition, deletion or substitution of connectives or short transitional sections.

6. Informational: changes which include the addition or deletion of information.

7. Stylistic: changes which involve the substitution of a word, phrase, or sentence for another where the informational context was not altered.

8. Organizational: changes which involve the rearranging of the elements at the sentence or paraagraph level.

9. Holistic: changes which involve a radical departure from the overall approach taken in the original report.

UNIVERSITY OF ALBERTA

Student Questionnaire on Revisions in Writing

PURPOSE: This questionnaire will help me, Mr. Kopp to study changes that grade five students make in their writings.

1. Do you like to write a lot?

2. Explain why you do or do not like to write a lot.

3. Do you make changes to your written work?

4. If you make changes to your work, what kinds of changes do you make?

5. If you make changes to your work, when do you make these changes? For example, during the writing or after the first or last attempt.

6. Why do you make changes to your written work?

7. Do you think changing your written work makes it better?

8. If you agree with the statement above, explain why you think changing your written work makes it better.

9. What kind of changes do you make when you write using a computer?

10. Why do you make these changes on the computer?

Thank you for answering these questions

Name: Date:

THE UNIVERSITY OF ALBERTA

GUIDELINES FOR A HOLISTIC WRITING ASSESSMENT

A. Purpose

The purpose of this holistic assessment of grade five written compositions is to obtain a general picture of the writing performance of students who wrote a story. To assist in the assessment the guidelines from the Student Assesment Branch (1980) of the Edmonton Public School Board were used.

B. Preparation

Two graduate students in the Department of Elementary Education have been selected as raters. They have been informed of a time commitment of about a four hours. The raters will be trained to score papers using a four-point numerical scale. Prior to the actual scoring, scorers will review typical grade five students writing and identify a pair of rangefinders representative of each of the four possible scores. A score of 4 will be considered the highest score and a score of 1 will be considered the lowest score. The trainer will provide the scorers with a general set of criteria in identifying each pair of rangefinders. Raters may discuss their findings during this rangefinding process. There are approximately thirty sample writings.

C. Scoring

All papers will be read by both raters. Scores will be added to determine a final score. Disagreements of more than

one point will be resolved by a third reader. The score will be the score of the third reader added to the nearest other score. Short breaks every hour will be planned during the scoring session which will immediately follow the training session. Approximately 24 actual compositions will be assessed by the two raters.

GENERAL SET OF CRITERIA FOR DETERMINING RANGEFINDERS

FOUR The paper reads smoothly, is carefully thought through and organized. The author's intentions are evident and awareness of the reader is present. There is evidence of precise vocabulary and the few mechanical errors that exist do not interfere with the author's intended meaning.

THREE The paper reads smoothly but may contain a few unnecessary or awkward sections. The writer shows some awareness of the reader. There is some evidence of precise vocabulary but it is sometimes inappropriate or too formal. There is some evidence of thought and organization but some sections may show thinking or organizational problems. There may be mechanical errors but they do not interfere significantly with the intended meaning. Mechanical errors may give evidence of a specific kind of problem.

TWO The paper reads unevenly. There is evidence that the

writer is gaining some control of some elements of the writing process, but there are several areas lacking control. Vocabulary is correct but it does not convey the author's intended meaning specifically. Content lacks clarity of thought and organization, although there is some evidence that the author knows what he means to say. The contol necessary to communicate precise thoughts is lacking. Mechanical errors interfere with the message to some degree.

ONE The paper is difficult to read, but some understanding of the author's meaning is present. The writer does not have an awareness of the reader. There is a general lack of thought and organization. Mechanical errors and sentence problems interfere with what is trying to be said.

The Toy That Came True

There was a boy, his mane was Tony, he liked to play with sets that he could make things with. One day Tony made a spaceship, he made it with his Construcx space set. He thought the spaceship was so good that he wished that it would come true.

That night when Tony was almost asleep he thought to himself that he herd a noise. He got up to see what the noise whas. Tony went into the kitchen, were he left his spaceshop, and the first thing he saw was his spaceship flying around the room! Then the first thing he said was, "Wow."!

The spaceship was the same as he had left it the day before but it could fly, talk, it was now also huge and all the little men that were fake just that morning were now real! Tony decided that he needed some sleep. Then he went to bed.

When he got up that morning he had almost forgot about his constucx set, that it was now real.

He got up put on his colthes then went into the kitchen. Tony was amased, the set was not on the table were it was last night! Tony looked for the set. After about a half hour he found the set it was hanging on the ceiling! It could not only hang on the ceiling but it had also blend into the other colors around itself. Tony didn't notice till now but the set could think for itself.

After Tony was finished his breakfast he started to look at the set more carefully, suddenly the set started to talk. This scared Tony, he screamed, then Tony's parents down the stairs. Tony thought he would be in trouble for sure. Then his parents came down and asked him what he was doing. He tried to hide the fact that his set was now real. But that did't help. His mom and dad saw the set under the table.

Tony's dad said, "What did you do now.".

Tony said,"Nothing dad honest I didn't do anything".

Tony suddenly herd his mom calling,"Tony,Tony,Tony,".

Then Tony realized that it was all a dream.

THE END

Floppy Disk

There once was a disk that was called floppy disk. You know why he was called floppy disk because he flopped around and got in trouble alot do you want to here what he did ?. Ok got your ears open here we go. There was a grocery store that had some customers so he went in the store one day and nocked everything over and got in trouble so he couldn't go in the store anymore so he went in the next day and did everything right . So the manager let him work there so they lived happily ever after. the end

by Mike Bolduc.

REVISION CATEGORIES USED IN THE STUDY

1. Cosmetic: changes in appearance of legibility of the original report.

1a.Technological: a subcategory of cosmetic revisions which is caused by the nature of the hardware or software. For example, hitting an extra key or using thewrong command key to underline would be technological kinds of revision.
2. Mechanical: changes in spelling, punctuating, underlining, paragraphing and capitalization.

3. Grammatical: changes to fit grammatical conventions like subject/verb or antecedent/pronoun..

4. Continuational: changes which include the addition of a word, phrase, sentence or section to the end of the original report.

5. Transitional: changes which include the addition, deletion or substitution of connectives or short transitional sections.

6. Informational: changes which include the addition or deletion of information.

7. Stylistic: changes which involve the substitution of a word, phrase, or sentence for another where the informational context was not altered.

8. Organizational: changes which involve the rearranging of the elements at the sentence or paraagraph level.

9. Holistic: changes which involve a radical departure from the overall approach taken in the original report.